

Technical Article
on New
FORMING
65
s Revealed
Automobile Maker in
STREAMLINED
PRODUCTION
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Lost Time Means
LOST PRODUCTION
PAGE 99

MACHINE AND TOOL
ENGINEERING

FEBRUARY, 1944

The TOOL ENGINEER

Official Publication of
American Society of Tool Engineers

On vital production runs...

25% Better Performance
With

**VICTORY
COBALT**

Vanadium-Alloys
STEEL CO. LATROBE, PA.

Side by side on the job with a well-known 18% tungsten, 8% cobalt steel, VICTORY COBALT under rigid test conditions gave performance ranging from 25% to 30% better in every respect—turning alloy steel cylinder barrels produced by a leading aircraft engine builder. Remarkable? Yes—and right in character for war-proved VICTORY COBALT!



PUBLISHED BY THE BRAMSON PUBLISHING COMPANY

THROUGH ALL THE RUSH

Unchanging Standards "Hold the Line"



Pratt & Whitney Jig Borer at work . . . laying the basic ground work for accurate mass production. In war and in peace, these precision machines perform invaluable service . . . produce the jigs and fixtures from which countless other machines and products stem. They also serve as "jig eliminators" on short production runs. Write for details.

ESSENTIAL starting point for volume production in both peace and war, Pratt & Whitney standards of basic accuracy have "held the line"—unchanged, uncompromised.

Despite war pressure for speeded output, P&W standards have not relaxed one iota. There's too much at stake—too many war assembly lines dependent for their speed upon the underlying basic accuracy of machine tools, cutting tools and gages that stem from P&W.

As builders of machines that make machines, P&W will continue to "hold the line" until Victory is won — and then to keep on holding it in the years of world rebuilding that will follow.



PRATT & WHITNEY

Division Niles-Bement-Pond Company
WEST HARTFORD • CONNECTICUT

A NEW STANDARD Dial Bore Gage

for measurements
ranging from $\frac{5}{8}$ " to 1"
with UX Indicator
graduated in .0001"

**Fast, Light,
Accurate...**

HERE'S the newest addition to the STANDARD family of Dial Bore Gages. A small, lightweight, fast, close-tolerance checking instrument for small bores comparable in accuracy with the larger size dial bore gages.

Utilizing the same centralizing principle of other STANDARD Dial Bore Gages, it is only necessary to insert the gage, and rock handle slightly. Minimum reading on indicator shows exact diameter. Even holes with obstructions such as shoulders, webs, undercuts, etc., can be measured because this Dial Bore Gage can measure within $\frac{1}{4}$ " from the bottom of blind bores. Operation is reduced to a minimum; accuracy and precision assured; and the range of workability is considerably increased as a result of improved design.

Other Dial Bore Gages with measuring range to $12\frac{1}{8}$ " completely illustrated and detailed in our new No. 10 Catalog. Send for it.

STANDARD Dial Snap Gage

STANDARD Dial Snap Gages combine PORTABILITY with speed in use and absolute accuracy on dimensions as fine as .0001". Adjustable gaging pin has a serrated flat surface tipped with tungsten carbide that practically defies wear. Opposite movable pin has mushroom top, also tungsten carbide. Point-and-plane construction assures continued, accurate readings whether instrument is set by cylindrical or flat standards.

16 Stock Sizes cover Range 0" to 8". Each can be set to measure any dimension within a range of $\frac{1}{2}$ ". Sizes measuring up to 4" designed as at right. Sizes 4" to 8", because of larger size, are made with convenient finger hole grip for greater ease in handling.

Write for Special Bulletin on STANDARD
Dial Snap Gages.



STANDARD TYPE
Gage No. 1

New, improved STANDARD Dial Bore Gage with diameter extensions furnished with each gage. Cross section shows gage in use.



**Combines
Snap Gage Speed
with
Comparator
Precision**

STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.



THE BETTER FASTENING METHOD

Completely Cold Forged

SOCKET SCREWS - made by a superior method, patented by Holo-Krome and used exclusively by Holo-Krome in the manufacture of these precision made FIBRO FORGED Socket Screws . . . The internal wrenching feature permits compact design in parts, machinery and machine tools—materials are used efficiently—weight is saved—all valuable space put to its full usefulness—assembly time reduced to a minimum . . . Daily applications prove Holo-Krome Socket Screws to be "the better fastening method".

SPECIFY "HOLO-KROME"

SAVE

WEIGHT - SPACE - TIME

^{GUARANTEED}
Unfailing **PERFORMANCE**

THE HOLO-KROME — SOCKET SCREW PRODUCTS —
SCREW CORP. HARTFORD 10, CONN. U. S. A.

THE TOOL ENGINEER

T. M. REG. U. S. PAT. OFF.

THE PUBLICATION OF MACHINE AND TOOL ENGINEERING

THE BRAMSON PUBLISHING COMPANY

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Publisher's Letter

THIS month's issue is packed, our staff believes, with features that should prove stimulating to a wide range of production-minded readers.

The table of contents lists 15 articles in addition to an even dozen departments and special features. Sprinkled through these stories are more than 126 photographs and 20 drawings, each to lend color to the news story reported or to help you better visualize the job discussed.

Just as the industry it serves has changed and expanded since America went to war, so has The Tool Engineer magazine. In February, 1942, two months after war was declared, "The Tool Engineer" featured seven major articles and nine regular departments.

This month's issue carries eight more articles and three more departments. That's what we call change and expansion!

Shop talk in a newspaper or magazine office usually revolves around the stories behind the stories you read. If you could drop into our editorial department as this is written, you might hear some of those stories.

For instance.... How we were able to put a complete technical article on the press before Goodyear made a short news announcement to trade magazines on the revolutionary aluminum forming methods they have developed.... How our editors beat the field in revealing the startling cost-saving automotive techniques for war production evolved by Oldsmobile engineers.... How one of our newsmen beat the bushes to nail down the facts on the machine tool industry's outlook for the year.... How Detroit's legendary Bill Stout, jumping to his feet, warned complacent automen at their S. A. E. meeting that tomorrow's cars had better be different!

I'm becoming more and more convinced that the every-day work of the production engineer has as much effect on the economy of an indus-

trial nation as any single factor.

Looking to post-war employment, for example, government can never legislate security and good-paying jobs for American workers. Only production engineers can produce those jobs... by cutting manufacturing costs to broaden product markets.

A burning question today is "how can we produce civilian products at a reasonable cost and pay today's hourly wage rates?" Since few unions will consent to reduce hourly wage scales, the task of finding a solution will be dumped in the production engineer's lap.

Where will he find the answer? In war-born supplies of new materials, new fabricating techniques and post-war improved machine tools.

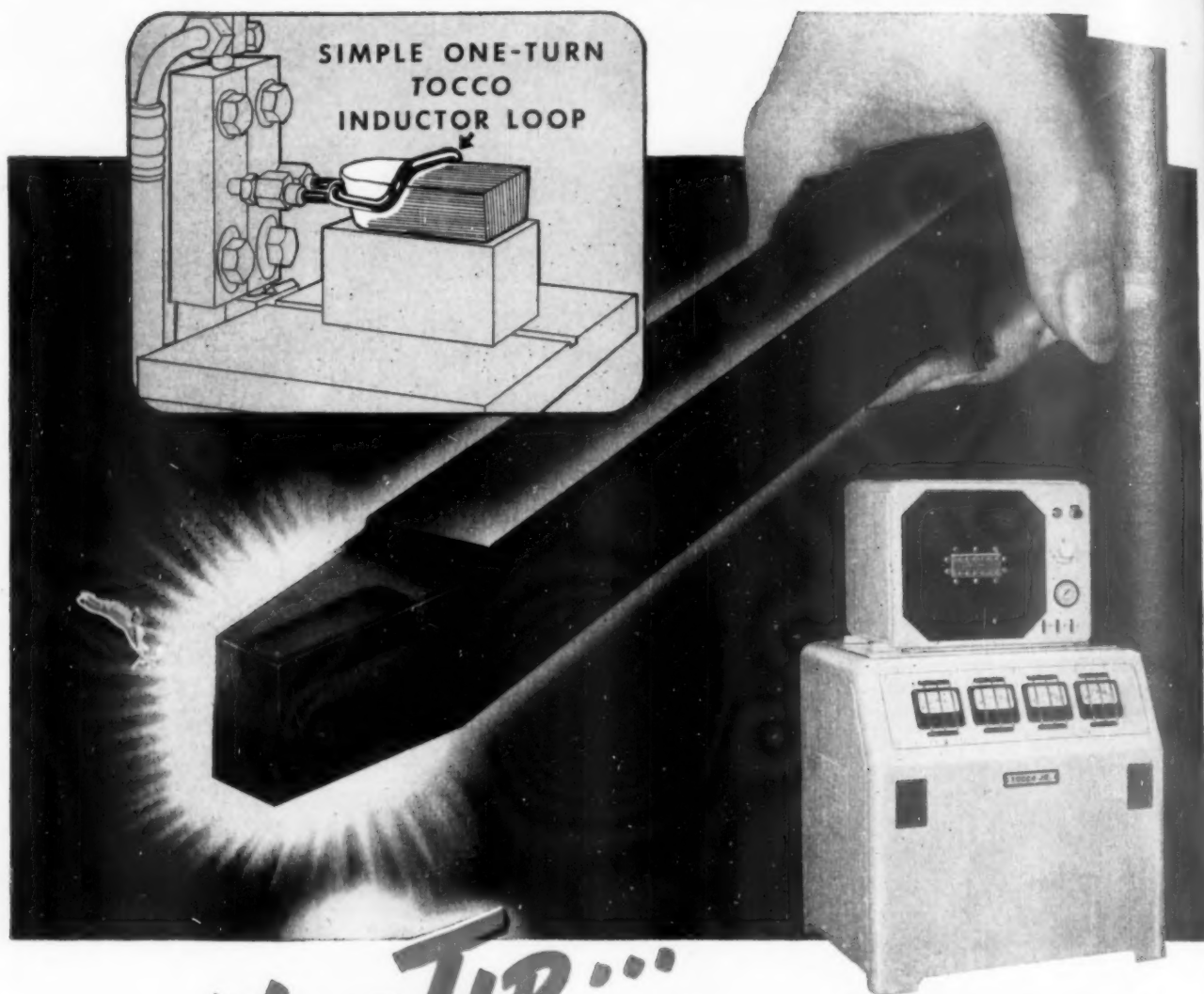
This issue features all of those subjects.

Cordially yours,

Roy T. Bramson

*Published the first Thursday of each month, by The Bramson Publishing Company. Advertising, Editorial, and General offices at 2842 West Grand Boulevard, Detroit 2, Michigan. Telephone: MAdison 4077.

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A HOT TIP...

Braze carbide tool tips with this "TOCCO JR. 7½" ... the new low-cost "heat-treating department" with a multitude of uses.

● Simply place the prepared shank and tip in the TOCCO inductor, press a button and in 10 to 30 seconds the tool tip becomes red hot ... so quickly the tool often can be removed with the bare hand before the heat has time to reach the far end!

Timing is automatic, accurate to a split second.

All sides of brazed joint are heated simultaneously, uniformly.

Speedy heating affords high rate of output.

Three sizes of inductor loops (which can be made readily in your shop from standard cop-

per tubing) cover the average range of tool sizes.

Clean, cool and compact, the "TOCCO JR." is ideal for the tool room or production line.

By simple change of work fixture, the TOCCO machine can be adapted to brazing, hardening, annealing or heating for forming of a wide range of parts ... for war or peacetime production.

Ask for bulletins on the New "TOCCO JR. 7½" and "TOCCO JR. 15" ... small, low-cost units ideal for brazing of tool tips and scores of other heat-treating applications.

THE OHIO CRANKSHAFT COMPANY • Cleveland 1, Ohio



TOCCO

**HARDENING .. BRAZING
ANNEALING .. HEATING**

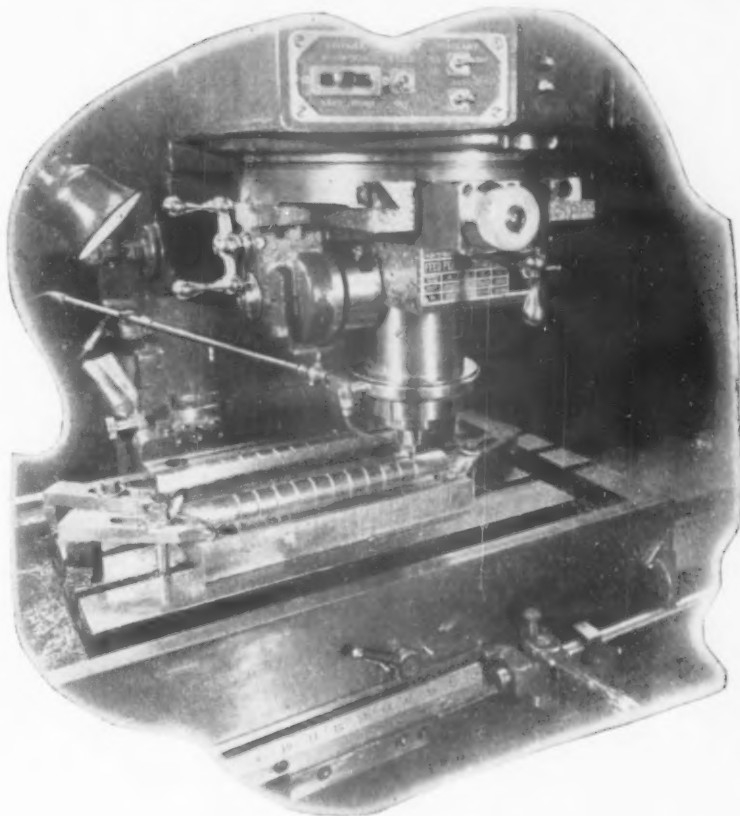


THE TOOL ENGINEER

ROTARY HEAD MILLER . . . PLUS CHERRYING ATTACHMENT . . . SIMPLIFIES THIS "TRICKY" MILLING OPERATION

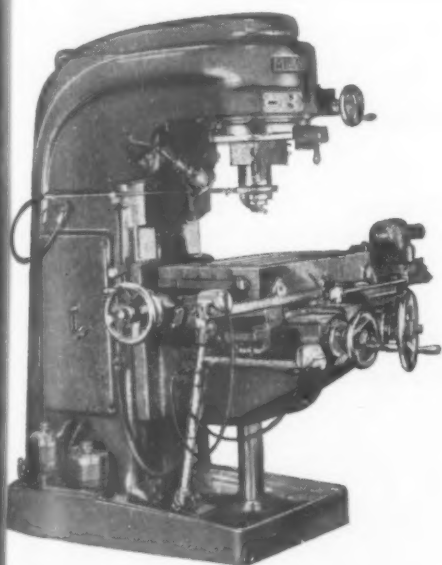
The Milwaukee Rotary Head Miller equipped with a cherrying attachment made "short work" of the "tricky" milling required on this injection mold. It took just two hours to complete the job — far less time than by any other method known.

The cherrying attachment is an auxiliary rotary head, mounted at 90° to the head of the miller. It is used to mill circles and angles in a vertical plane. When used with rotary head motion, spherical and conical cavities can be accurately and rapidly milled — in almost all cases difficult operations become a comparatively simple task.



KEARNEY & TRECKER'S ROTARY HEAD MILLER

The Most Versatile Machine Ever Designed for Mold and Die Work



DIRECT . . . mills mold cavities in a single set-up without the aid of templates or models.

ACCURATE . . . chances for error are eliminated because there is no change in set-up. Exact control of all combinations of cutting movements — possible only with this machine —

transmits mathematical precision to the work.

FAST . . . initial job preparation and set-up time is reduced to the minimum. Accurate performance of the machine saves operator's time and rapid production of intricate molds and dies is the result.

Write for Bulletin No. 1002C for complete information on the Milwaukee Rotary-Head Miller and the accurate and rapid production of all types of molds and dies.

Rotary Head
Milling Machine

Automatic
Jig Borers

Kearney & Trecker
Products
CORPORATION
Milwaukee, Wisconsin

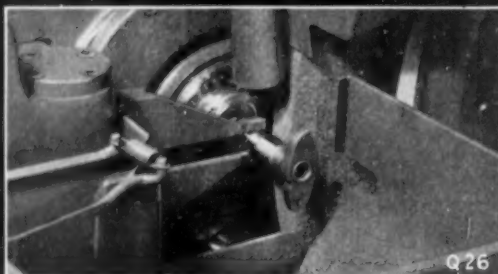
Milwaukee
Face Mill Grinder

Milwaukee
Midgetmill

Milwaukee

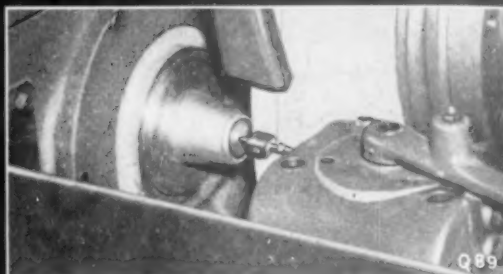
TO FINISH THE JOB QUICKER . . .

GRIND SMALL CAMS WITH EQUIPMENT LIKE THIS



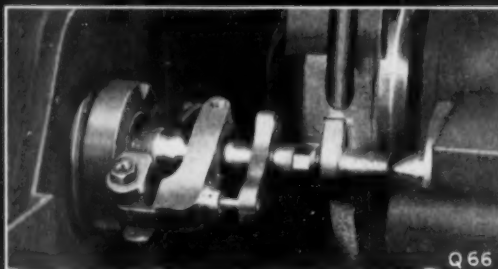
Q 26

An ignition timing cam being ground on a Landis 6" x 18" Type C Plain Grinder using a loose cam grinding attachment.



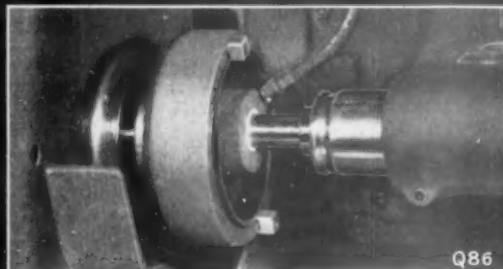
Q 89

A small rotor being relief ground on a Landis 6" Type C Plain Grinder equipped with an integral cam grinding attachment.



Q 66

A small integral cam being ground on a Landis 12" x 36" Type LC Universal. An integral cam grinding attachment is used.



Q 86

A cam used in the manufacture of aircraft being internal ground on a 12" Type LC Universal, using a loose cam grinding attachment.

Why invest in costly specialized equipment for the grinding of small cams when you can perform the same operations on Landis Cam Grinding Attachments such as those

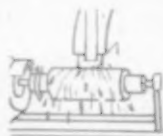
shown above. When not in use, the attachment can be removed and the otherwise perfectly standard machine can be used for conventional operations.

Unusual



Performance as Usual

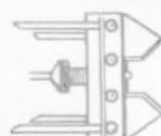
LANDIS TOOL CO. WAYNESBORO, PENNSYLVANIA.



FIRST TO USE A
COOLANT SYSTEM
AS INTEGRAL
PART OF GRIND-
ING MACHINE.



FIRST TO suc-
CESSFULLY APPLY
HYDRAULICS
TO GRINDING
MACHINES
GENERALLY.



FIRST TO DE-
VELOP MANY NEW
FEATURES SUCH
AS LANDIS-SOLEX
SIZING.

On a GORTON 16-A

50,000

GREATER ACCURACY... IMPROVED FINISH Reduced Grinding Down-Time Faster, Low Cost Setups

This manufacturer selected the Gorton 16-A Precision Automatic Screw Machine to obtain greater accuracy and improved finish in machining these cam follower pinions—each completed in *one* operation in 6 seconds!

Simple, single-point tools—easy to grind—brought savings in down time required for grinding the forming tool used in previous methods. Rigid construction of the Gorton 16-A—the heaviest Swiss-Type Screw Machine built—enabled precision performance 21 hours daily on production runs of 50,000 parts. Gorton accuracy and Gorton finish eliminated subsequent operations.

Wide Range of Work

The Gorton 16-A produces an almost endless variety of short or long, slender parts—diameters .005" to 7/16", lengths 1/32" to 2 1/4"—complete in one operation.

It does step turning, generates curves, tapers, back recesses, knurls, chamfers, etc. It centers, drills, slots, threads or taps.

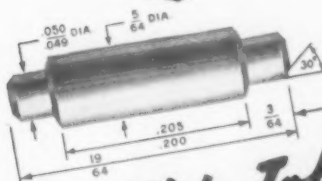
Tool slides are easily accessible. Micrometer adjustments for all tools insure accurate, quick setups at low cost. Centralized fingertip controls provide infinitely variable spindle speeds (1100 to 10,000 R.P.M.) and infinitely variable cam feeds (20 to 720 pieces per hour; 20 to 1440 optional). No speed or feed gears to change.

GORTON Complete Cam and Tool Service

For Any Make Swiss-Type Screw Machine—Gorton or Others

Gorton exclusively offers a complete cam and tool service. Highly skilled engineers are available to take care of all your needs. This service consists of a detailed cam and tool layout, listing all operations of the machining cycle together with necessary cams, tools, collets and bushings. This service is available at the Gorton factory at Racine, Wis., for the Midwest and Pacific areas; and from Russell, Holbrook, and Henderson (our Eastern Distributors) of New York City for quick service in the East.

Small
Parts
like this



*How This Job
Was Done*

TOOLING: 4 standard single-point cutters. 4 flat cams.

SEQUENCE OF OPERATIONS:

- 1—Turn 30° taper 1/64" long and turn 2° to 3° taper 1/32" long to diameter of .0495" (±.0005").
- 2—Advance headstock .205" and plunge cut for 3/64" diameter of .0495" (±.0005").
- 3—Turn taper 2° to 3° 1/32" long and turn 30° taper 1/64" long.
- 4—Cut off finished part.

MATERIAL: 5/64" dia. S.A.E. No. 1060 steel.

PRODUCTION: 10 pieces per minute.

These other
typical parts
shown
actual size

GEORGE GORTON MACHINE CO.
1322 Racine St., Racine, Wis.

Send me, without obligation, FREE bulletin with complete information covering the Gorton 16-A Precision Automatic Screw Machine.

Name.....Title.....
Company.....
Address.....
City.....State.....

GET THE FACTS NOW

Mail Today for
FREE Bulletin

GEORGE **GORTON** MACHINE CO.

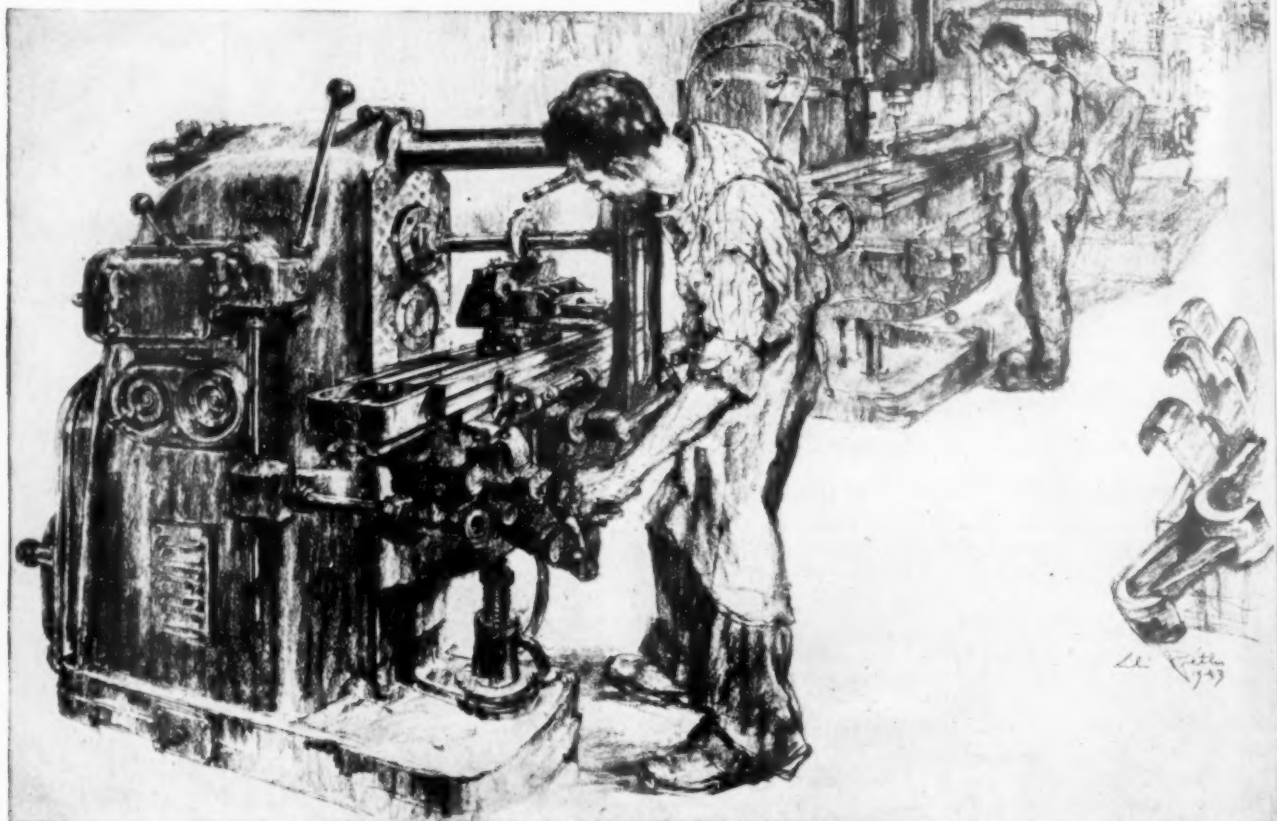
1322 RACINE STREET, RACINE, WISCONSIN, U. S. A.

SPECIALISTS FOR 50 YEARS IN TRACER-CONTROLLED MACHINES—ENGRAVING, DIE MAKING, VERTICAL MILLING MACHINES



For War or Peace

A DEPENDABLE MILLING MACHINE



Simmons No. 1A Micro-Miller, Drawn by Lili Rethi

★ SIMMONS HAS PRODUCED a machine particularly adapted to the requirements of the manufacturing and jobbing shop for the milling of miscellaneous parts. The No. 1A Micro-Miller is *low in cost, sturdy and simple to operate.*

★ Because of the ease of operation and close grouping of all controls, it is equally efficient on production runs as well as limited quantities requiring frequent set-ups. All control levers are grouped on the left side within immediate reach of the operator.

★ Within the one-piece column and base is the patented Simmons *Micro-Speed Drive* unit, providing an infinite number of spindle speeds throughout two speed ranges. The correct spindle speed is immediately available by turning the Selector Dial while the spindle is in operation. This is particularly useful when using the newer Tungsten Carbide cutters, which provide maximum production and tool life.

★ Investigate the merits of this compact miller by writing today for complete details. Simmons Machine Tool Corporation, 1810 North Broadway, Albany 1, New York.

***Simmons-Built* MACHINE TOOLS**



THE TOOL ENGINEER

LATROBE

TUNGSTEN HIGH-SPEED

Steels



ELECTRITE No. 1

ELECTRITE No. 19

ELECTRITE Vanadium

LATROBE offers a complete series of straight tungsten high speed steels, each of which is the product of rigidly controlled metallurgical processes, resulting in the finest quality steels obtainable in their field. They differ primarily in vanadium content, thus giving you a choice of steels for varied production requirements.

Electrite No. 1

A general purpose tungsten high speed steel, (1% Vanadium) for use where maximum toughness is desired.

Electrite No. 19

A tungsten high speed steel with 2% Vanadium for greater wear resistance and improved production.

Electrite Vanadium

The latest development in tungsten high-speed steels containing over 3% Vanadium and affording maximum wear-resistance.



Latrobe **ELECTRIC STEEL COMPANY**
MAIN OFFICES and PLANT • LATROBE • PENNSYLVANIA

METAL CUTTING INDUSTRY HAILS TANTUNG

Miracle Metal Establishes New and Amazing Records

TANTUNG
New Non-Ferrous Cast
Alloy Replaces High-
Speed Steel Tools —
is Proving to be of
Tremendous Advantage
to the Metal Cutting
Industry.

Tantung is the trade-name of the most advanced non-ferrous cast alloy for metal cutting. It was developed to "Fill The Gap" between conventional High-Speed Steel Tools and Cemented Carbides—a long-felt need in the metal cutting field. Scientists of the Fansteel Metallurgical Corporation, an affiliate of the Vascoloy-Ramet Corporation, spent years of research and experiment in perfecting Tantung. Performance records developed under all shop conditions establish Tantung as the most outstanding contribution to the metal cutting industry since the advent of Cemented Carbides.

CUTS ANY METAL THAT CAN BE MACHINED

More than a million Tantung tools have been used by the trade for practically all machining operations. Tantung cuts rolled, forged or cast steel, annealed or heat treated, cast iron, aluminum, brass, copper, bronze or any material that can be machined.

Tantung has an exceptionally high transverse rupture strength. It is tough and shock resistant. Hardness, to be a practical gauge of wear resistance, must be measured at working temperature. It is the high red hardness of Tantung, higher than any high-

speed steel, that enables it to work so efficiently under heavier loads. This virtue, coupled with Tantung's peculiarly low coefficient of friction, contributes to the remarkably long life between grinds. Tantung far surpasses all performance records of high-speed steel for pieces produced per grind.

Tantung can be operated at far greater speeds than are recommended for high-speed steel. Tantung permits heavier cuts and heavier feeds. It is an excellent finishing tool and on most materials the finishing cut can be taken at at least one speed faster than the roughing cut.

TANTUNG IS SELF-LUBRICATING

Tantung's basic formula includes tantalum carbide. Tantalum carbide not only imparts a self-lubricating action to Tantung tools, but in combination with other materials makes possible the dense structure that is responsible for the keen, durable cutting edge. "Cratering" or "chip wear" is reduced to a minimum.

NO SPECIAL TRAINING OF OPERATORS REQUIRED

Standard Tantung tools fit all standard tool posts and holders, and personnel trained to high-speed tool practices can readily employ the same techniques to produce vastly superior results with Tantung tools.

(To insure efficient cutting under various speeds and with different tools, we furnish Wall Charts and Pocket charts to guide the workman in proper tool selection. These are furnished free upon request regardless of whether our tools are used.)

HOW TANTUNG "FILLS THE GAP"

Tantung is not recommended as a substitute for Cemented Carbide tools; it should be specified where Cemented Carbides cannot be used effectively. In the jobbing shop, maintenance departments, and smaller production shops where a great variety of work is handled, the versatility of Tantung recommends its use from the point of tool economy. Bronze, cast iron, aluminum, plastics and steels can all be machined by the same tools with actual cutting time substantially reduced.

HOW TO USE OLD MACHINES TO MAXIMUM CAPACITY

Old machines very often do not have sufficient speed for Carbide and, in combination with vibration and worn gears, Carbides cannot be used effectively. Tantung enables these machines to be used to capacity. This

is especially true with small diameter work. Often-times Tantung and carbide-Tantung for the small diameter and Carbide for the large diameter—are teamed together in the same operation with excellent results.

HEAT TREATED ALLOYS MACHINED WITHOUT DIFFICULTY

The ever increasing use of heat treated alloys ordinarily presents machining difficulties that Tantung successfully overcomes. Machining these alloys requires sharp side and top rake angles that cause chipping of the Cemented Carbide tools. The greater toughness of Tantung supports the cutting edge at these angles and the tantalum carbide content aids the sliding of the chip causing less chip pressure.

COMPARATIVE PERFORMANCES OF TANTUNG TOOLS AND HIGH-SPEED STEEL TOOLS

MACHINERY MANUFACTURER REPORTS: "Using a 20-year old boring machine on 18-8 stainless steel with welded joints, High-Speed Steel and Carbides failed miserably. Tantung tool bit completed the job in three hours with mirror-like finish."

A PUMP MANUFACTURER ADVISES: "Tantung is truly the Miracle Metal. In machining Navy Bronze on a Kearney & Trecker milling machine, Tantung cutter performed a miracle. Tantung produced 26,250 pieces per grind against 3750 for high-speed steel cutter."

A LARGE FORGE COMPANY WRITES: "Ran Tantung at double the speed used for high-speed steel. Tantung produced four times the amount of cutting as against high-speed steel operation—machining scaly, nickel, chrome forging, Brinell 321; on a 42" axle lathe."

Tantung tools operate efficiently at speeds not possible with high-speed steel tools. On an average, speeds and feeds can be increased 50% to 200% over high-speed steel according to variables occurring in materials and machines. More detailed performance data, more specific information regarding Tantung "The Miracle Metal" is interestingly graphed and illustrated in the new Tantung catalog. For copies of Catalog, Wall Charts, Pocket Charts, address: Vascoloy-Ramet Corporation, North Chicago, Illinois.

4442

★
Y
PHOTO BY
U. S. ARMY
SIGNAL CORPS

FULL SPEED AHEAD
the Order of the Day
is being attained
with



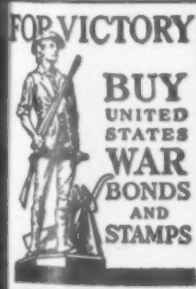
Automatic CHUCKING EQUIPMENT

Wherever the call has come for production and still more production in the great metal working Arsenal of Democracy, the answer has been universally the same—more parts in less time have come rolling off production lines.

P&J efforts to attain higher productivity than ever before have been two-fold—first in building a vastly increased number of Automatic Chucking Machines and second in developing tooling for the users of these machines to achieve remarkable results in output per machine. Time schedules, seemingly impossible to attain, are being met with outstanding success.

Not content with even these attainments, P&J engineers are constantly bettering performance by leaving no stone unturned in tooling which has any possible chance of clipping seconds from the time of machining operation.

The POTTER & JOHNSTON MACHINE CO., Pawtucket, R. I.



When Uncle Sam needs more tanks—give them to him with

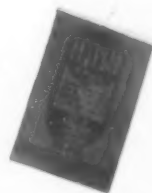
MORE WAR BONDS



PROPER SHARPENING MEANS LONGER HOB LIFE

SINCE the demand for hobs is still taxing specialized manufacturing facilities beyond capacity, it is important that users of these precision cutting tools employ every possible means to see that each hob delivers its maximum useful life. *Carelessness in sharpening may result in unnecessary waste of potential cutting power.* The original sharpening on the hob must be exactly duplicated when it becomes dull or the hob will lose some of its accuracy and produce unacceptable work. Valuable life is then lost in resharpenering it correctly. If allowed to become too dull before it is sharpened, a needlessly large amount of material may have to be

removed. Accurate spacing of cutting teeth must be maintained to provide uniform cutting action. A number of our customers have studied this problem in great detail as it applies in their own plants, and have set up sharpening standards resulting in substantial economies. The fundamentals of proper hob sharpening are illustrated and explained on pages 272-282 of our booklet, "How To Get The Most Out Of Your Hobs". We suggest that everyone in your plant who is concerned with the use and handling of hobs be acquainted with these factors in order to get the most out of your hobs!



SEE PAGES 272-282

Buy
War
Bonds



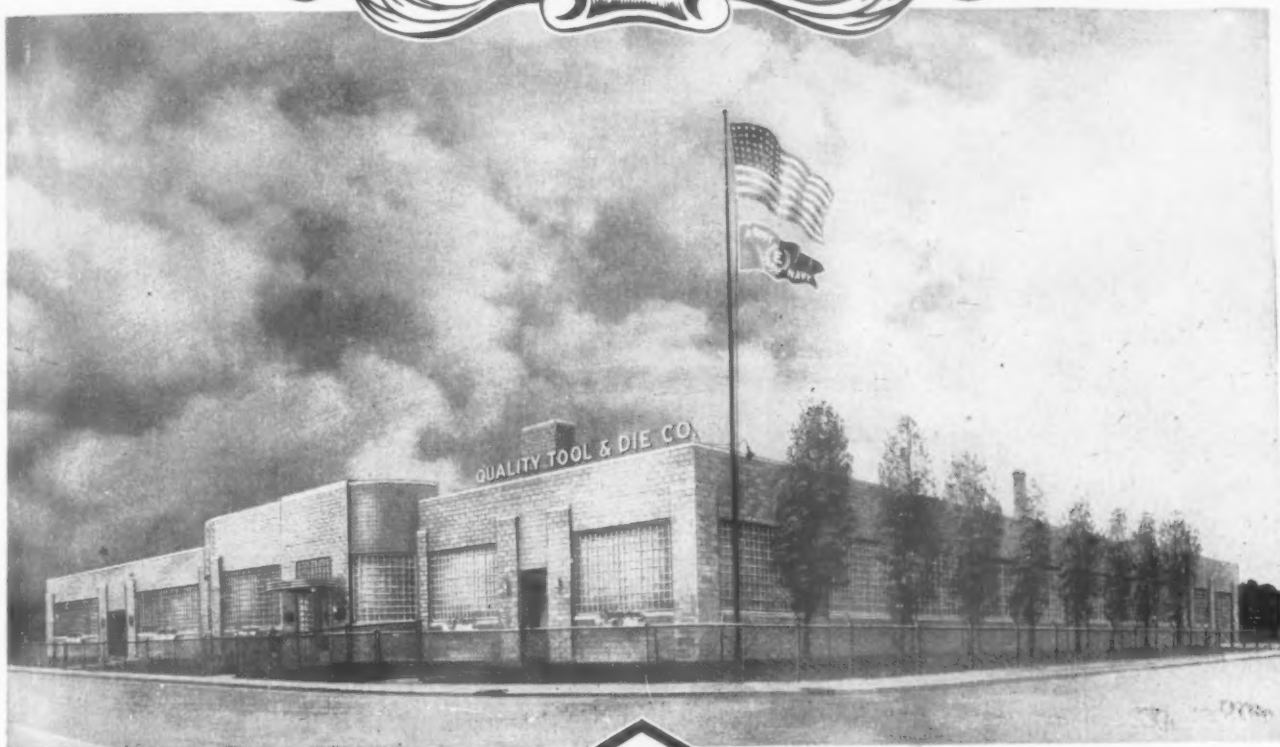
Barber-Colman Company

GENERAL OFFICES AND PLANT • 105 LOOMIS STREET • ROCKFORD, ILLINOIS, U. S. A.



EXPANDING
EXPANDING
TO MEET TODAY'S NEEDS AND
TOMORROW'S OPPORTUNITIES

This newly enlarged plant provides our skilled executive and production personnel with facilities to fill the flood of war-time orders for "Quality" Precision Gages. These same proven facilities will be at your service in solving Post-War Tooling and Manufacturing problems.



Manufacturers of "QUALITY" Products

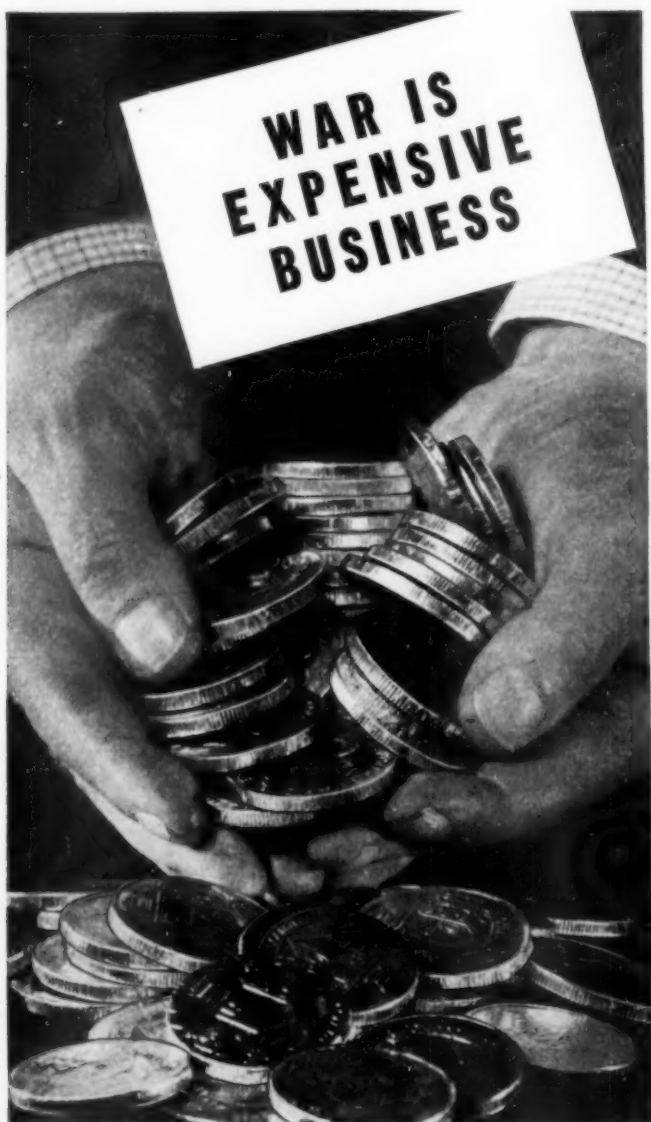
★ ★ ★

Speed Victory — Buy War Bonds



405 N. NOBLE ST.
INDIANAPOLIS 2, INDIANA





●Help your Government keep the cost of this war down. You can recondition or convert your old, worn tools into new or Special tools—at a saving of 50%.

By reconditioning such used equipment, you are doing much to help curb the nation's cost in this war—and you are saving the vital materials needed to produce the tools.



●Let us demonstrate that we are specialists in this type of service.

Our experience, extending over thirty years, has taught us how to handle the most difficult jobs with efficiency, economy and speed.

A COMPLETE RECONDITIONING SERVICE FOR TOOLS

NEW MILLING CUTTERS FROM OUR STOCK OR YOUR OWN STANDARD CUTTERS
CAN BE QUICKLY CONVERTED TO SPECIAL CUTTERS



EASTERN CUTTER CORPORATION 30-32 Littleton Ave., Newark 7, N. J.



Chrome Plant **MASTER CHROME SERVICE INC.**, 5709 Herman Ave., N. W., Cleveland, Ohio

a drop in time
saves... **TROUBLE!**



**PUT SEVERAL DROPS OF OIL IN
ALL OIL CUPS TWICE A WEEK!**

A little oil at regular intervals is the best protection. A lot of oil, too late, won't save an injured part.



★ Reproductions of this page on enameled paper are available for bulletin-board use in your turret lathe department. Write the Gisholt Machine Company, 1219 East Washington Avenue, Madison, Wisconsin. Ask for the series of "Wartime Care and Operation Posters." State quantity desired.



how to Fit the Tool Steel to the Job...

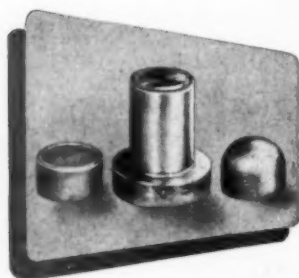
Longer tool life — more output per week from every tool — depends a lot upon selecting the proper tool steel for each job.

And that is where Carpenter can help you — by offering a tried-and-proved method of finding the one tool steel that will do each job best.

In thousands of plants, the Carpenter Matched Set Method of selecting tool steel is providing longer tool life. It is saving many hours that might otherwise be spent for re-grinding, repairing or replacing tools that

fail prematurely. It is giving tool steel users an *easier* method of selecting the proper tool steel *at the start of each job*. For help in using the Matched Set Method to solve your tool steel problems, ask for the Manual shown below.

And for on-the-spot service, take advantage of the experience of your nearby Carpenter representative. He can show you how to put this useful method to work, improve heat treating procedure and boost output per tool. Put his experience to work on your problems today.



How One Tool Steel User Solved A Tool Failure Problem...

THE TOOL: A coining punch for forming bearing races from 1015 steel. Production speed—16,000 pieces per day.

THE PROBLEM: Again and again, tools would fail after running only a half-day.

THE SOLUTION: Needing *greater toughness*, they selected Solar tool steel and got these results:

1. Tool life increased from 8,000 to 200,000 pieces, and the tool room had 48 fewer tools to make each month.
2. Output was stepped up 11,160 pieces per month.

THE CARPENTER STEEL COMPANY, 122 W. BERN ST., READING, PA.

Put the Carpenter...

MATCHED TOOL STEEL MANUAL

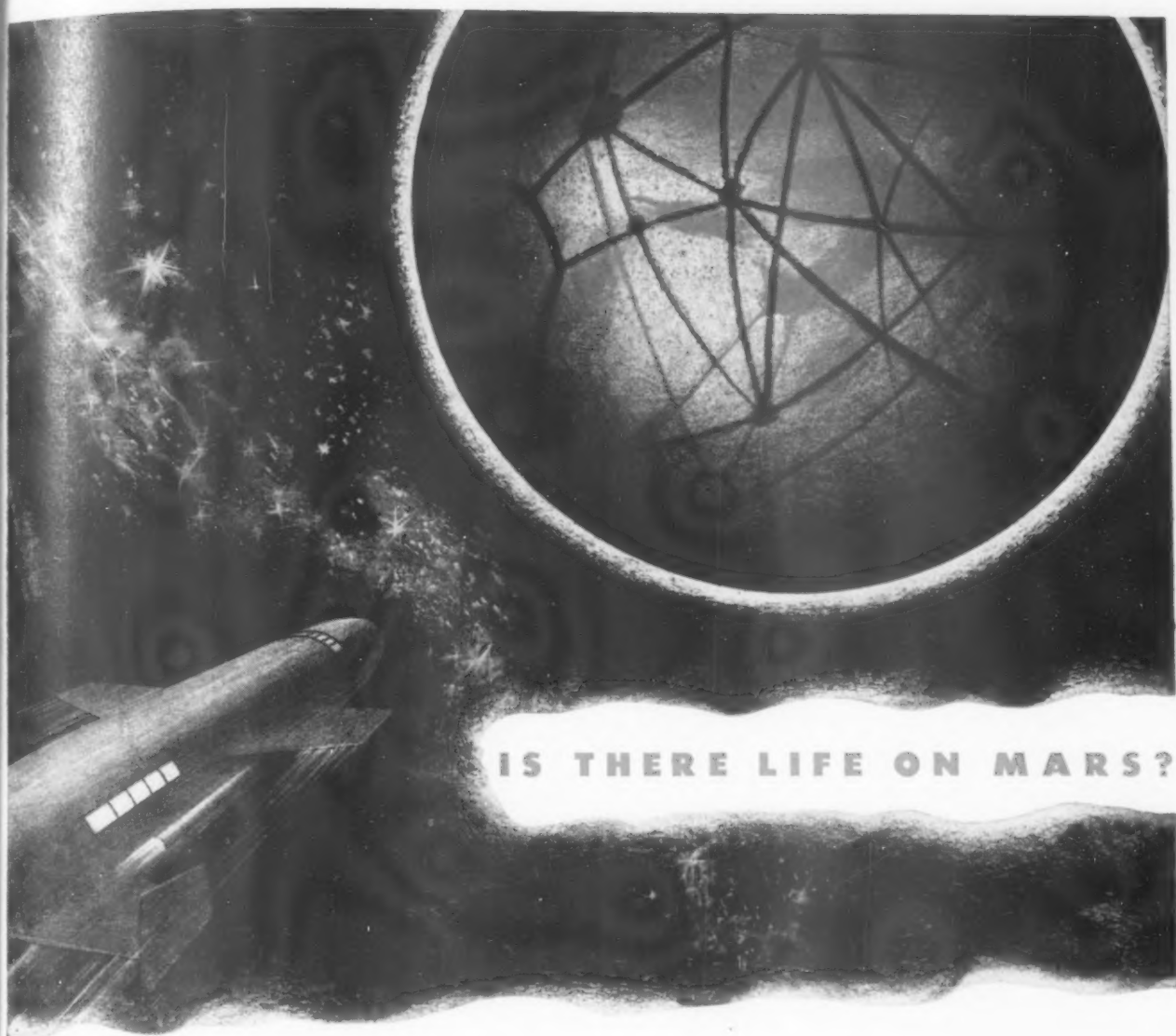
... to work in your plant!



Ask for this handy Manual. It contains an alphabetical *Tool Index* and *Steel Selector* and *simplified* heat treating instructions. You can quickly spot the proper tool steel for any one of more than 200 types of tools. This Manual is offered free to tool steel users in the U.S.A. who request it on their company letterheads.



Carpenter
MATCHED
TOOL STEELS



IS THERE LIFE ON MARS?

It is one of the most fascinating riddles of our time. For powerful telescopes have brought to light a strange network of "canals" on the planet's surface . . . Magnifying a celestial spark to the size of the moon, the power of light and a lens reveals facts never before suspected.

We have a parallel to make that is likewise interesting, and may be of importance to you. We manufacture an industrial instrument known as the Jones & Lamson Optical Comparator. It, too, consists primarily of light and a lens. Its purpose: rapid, accurate inspection.

Now this machine—by means of an enlarged shadow—reveals facts about the nature and the accuracy of parts that are often unobtainable by any other method of gaging.

It makes possible the measurement and inspection of complex surfaces faster, more reliably and more *easily* than is possible with any other form of gage.

Because of this, Jones & Lamson Optical Comparators are in use today by leading producers in virtually every line of production . . . and the record of these machines in helping to cut costs and speed production is the important part of the story.

In the change-over ahead, Jones & Lamson Optical Comparators are going to be of tremendous value. Why not get ready now to meet—and beat—fierce postwar competition? Jones & Lamson Inspection Engineers can help you. Call on them now.

JONES & LAMSON

MACHINE COMPANY

SPRINGFIELD, VERMONT, U. S. A.



Manufacturers of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.

Profit-producing Machine Tools

HONING helped create "400" Aviation



The tactical need for outflying our enemy has crowded military aviation into the "400" bracket, as may be seen in the comparison below:

	WORLD WAR I	WORLD WAR II
Speed	130 MPH	400 MPH
Period Between Engine Overhauls	40 Hours	400 Hours
Tactical Ceiling	12,000 Feet	40,000 Feet
Engine HP	125 HP (Liberty)	2,000 HP

This amazing advancement has been accomplished largely by better engineering design, better metallurgy and better controlled machining. Microhoning provides one of the most important machining controls by assuring maximum quality and safety in the bearing surfaces of our military and naval plane engines and other plane mechanisms.

Bearing bores and other critical surfaces are finished by Microhoning—the modern abrading process which removes stock at rates up to 65 cubic inches per hour, generates accuracy for roundness and straightness of bore within .0002" to .0003" and any desired surface finish.

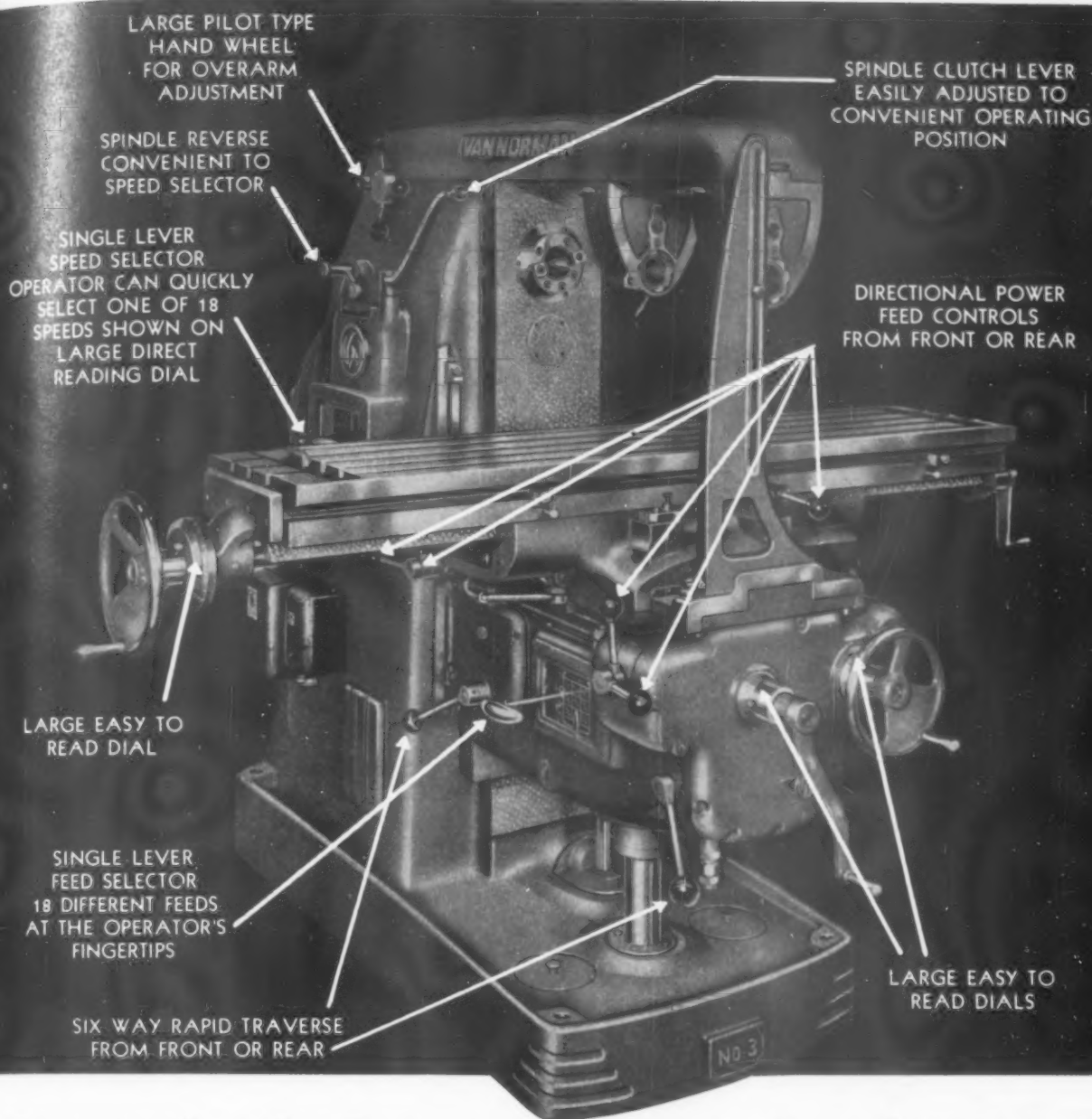
Better planes for war mean better planes for the peace to come.

Some Microhoned Aircraft Bores

Engine Cylinder Barrels
Master Con Rod (all bores)
Articulated Rod (all bores)
Piston Pin Bores
Valve Guide Bores
Pinion Gear Bores
Oleo Cylinder Bores
Brake Cylinder Bores
Gun Turret Hydraulic
Cylinder Bores and
many other parts



MICROMATIC HONE CORPORATION
DETROIT, MICHIGAN



Conveniently Grouped, Easy to Reach Controls Speed Output on Van Norman Millers

All operating controls on Van Norman milling machines, such as front and rear directional power feed controls and six-way rapid traverse . . . single lever speed and feed selectors . . . spindle reverse selector . . . spindle clutch lever . . . are readily accessible and easily reached at all times by the operator. The result—increased work accuracy, greater output, and reduced worker fatigue.

Van Norman Millers are available in many models

and sizes—Ram type Universal millers for all purpose milling operations . . . Horizontal millers . . . Vertical millers . . . Production millers . . . Contour millers . . . Hand mills—each designed to provide fast, accurate milling with the utmost ease of operation.


Van Norman Company
SPRINGFIELD 7, MASSACHUSETTS

IT PAYS TO VAN NORMANIZE



Handbook on Precision

With this useful book on your desk, you'll always know where to look for Cutting Tools and Gages to help you maintain today's precision standards.

The gages and tools that bear the PM brand you can always trust—they are made by people who *know* your requirement.

Send today, on your letterhead, for your copy of the PM Handbook.

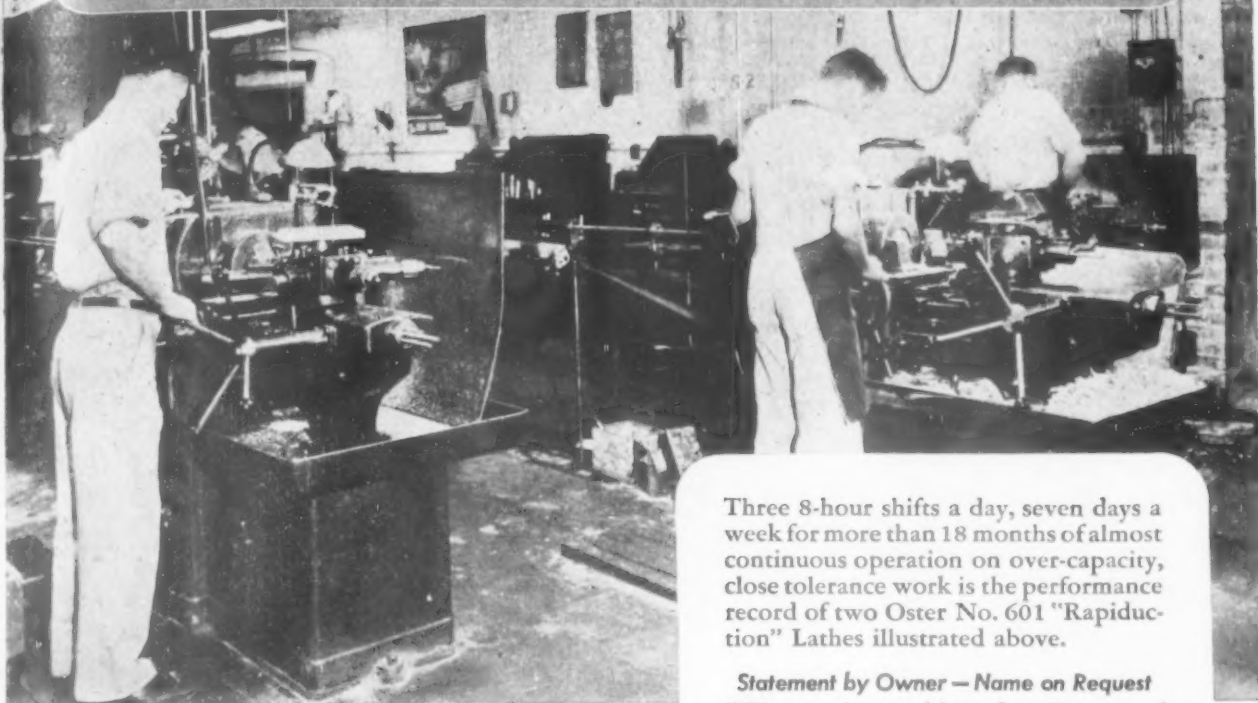


The PIPE MACHINERY COMPANY Cleveland, O.

GAGES • HOBS • MILLING CUTTERS • SPECIAL TOOLS

"ACCURACY REMAINS SURPRISINGLY CONSTANT"

Reports a "round-the-clock" user of Oster No. 601 Rapiduction Lathes



Three 8-hour shifts a day, seven days a week for more than 18 months of almost continuous operation on over-capacity, close tolerance work is the performance record of two Oster No. 601 "Rapiduction" Lathes illustrated above.

Statement by Owner — Name on Request

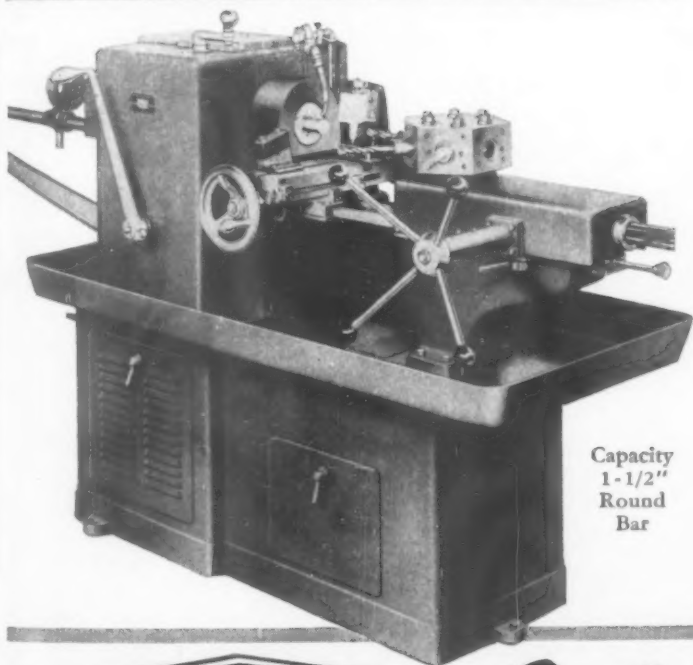
"We use the machines for all types of semi-automatic set-ups for studs, screws, and other close tolerance work. Due to lack of other machinery, the work placed on the Oster lathes has, in the majority of cases, been above the capacity in size for which the machines were designed.

"Regardless of this, they have carried on admirably and down-time has been very small.

"Accuracy remains surprisingly constant."

Ask your nearest Oster Distributor for a copy of illustrated Catalog No. 27B or write direct to . . .

THE OSTER MANUFACTURING COMPANY
2063 EAST 61st ST., CLEVELAND 3, OHIO, U. S. A.



Capacity
1-1/2"
Round
Bar

OSTER

Cuts Your Costs!

BEFORE YOU PUT HOLES IN SHEETS

ANGLES

CHANNELS

BY any METHOD... *investigate*

WALES PUNCHING EQUIPMENT

TIME AND MONEY SAVING FEATURES

1. Usual time-consuming adjustments of conventional set-ups are eliminated
2. Punch and die held in alignment by holder
3. Each unit is independent and self-contained
4. Straight line, staggered or scattered patterns with same units
5. Same units may be used interchangeably on press brakes and stamping presses
6. Nothing attached to press ram
7. Individual units may be instantly removed or reset
8. Interchangeable punches without disturbing set-up
9. Die setting and press "down time" reduced to minutes
10. Same units may be used and re-used in active patterns

Take up this invitation by putting your hole punching problems up to Wales-Strippit.

Hundreds of metal fabricators are now using Wales Equipment *profitably*.

Wales-Strippit manufactures a complete line of hole punching units and are prepared to develop and manufacture hole punching equipment for special operations and techniques.

"There's Always Something New in the Wales Line."

Write for Catalog C.

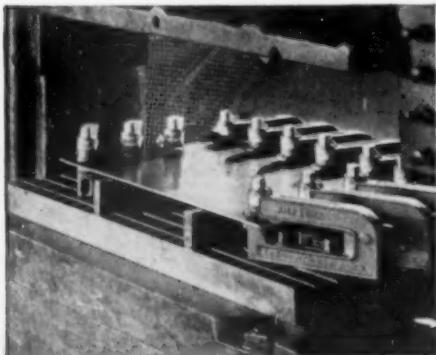
WALES-STRIPPIT CORPORATION

George F. Wales, President

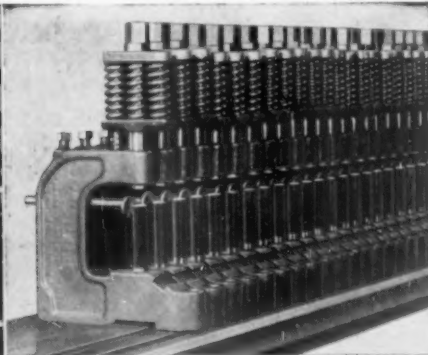
353 PAYNE AVENUE • NORTH TONAWANDA, N. Y.

Specialists in Punching and Notching Equipment

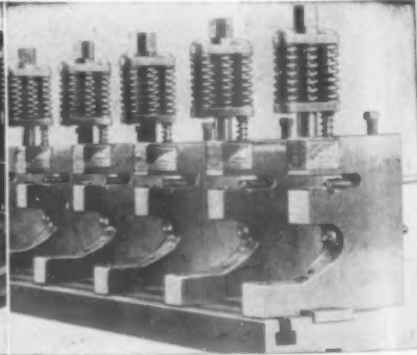
Wales Type "B" Units for punching sheet material in stamping presses.



Wales Type "C" Units designed for punching angles and sheets on press brakes.



Wales Type "E" Units to punch extruded shapes and channels on press brakes.



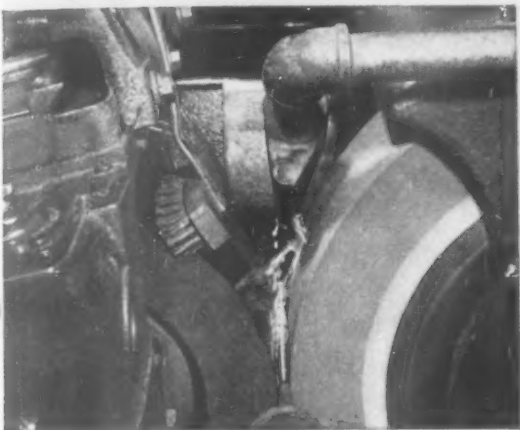
CUTTING TOOL TIPS FROM THE TOP-NOTCHERS



"In Precision Grinding make certain the wheel fits the operation"

says C. E. QUAY, General Mgr.
OHIO TOOL COMPANY
Cleveland, Ohio

Ohio Tool Company, engaged 100% in war work, is today one of the largest manufacturers of small arms ammunition tools. This accomplishment has been made possible by the development of new methods and equipment, which, in turn, have resulted in a higher rate of production at lower cost.

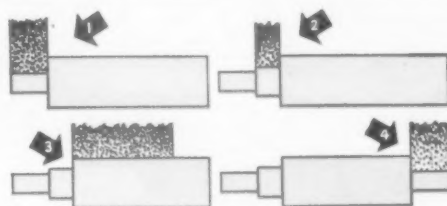


"TO use a different wheel for every grinding operation in the plant would be a highly impractical and costly proposition. On the other hand, using too few wheels to do a multiple number of jobs sacrifices accuracy and speed of production; requires more manual handling.

"The answer to this problem is profile or centerless grinding . . . a development that grew from the unprecedented production demands of World War II. Precision profile grinding, for example, has made it possible to finish small arms ammunition tools, principally punches, on a production basis. Previously they had been ground

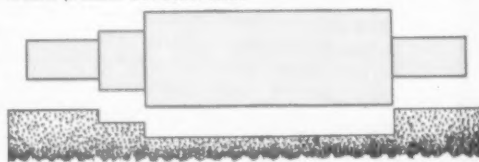
singly or a few at a time on conventional tool-room grinding equipment. Internal grinding to finishes of 2 to 4 micro inches is not uncommon on small arms ammunition tools.

"As the sketches below indicate, the ability to centerless-grind several diameters, including tapers, radii, profiles, etc., simultaneously, has reduced what formerly required several operations, to one. In this way, less equipment is needed to produce larger quantities of more uniform tools, releasing additional equipment for other war necessities."



Above: Using ordinary methods to grind the piece of work shown would require 4 separate grinding operations.

Below: Centerless grinding does the 4 jobs in 1 operation with greater precision and better finish.



The proper selection of grinding oils is as important as the selection of the correct grinding wheel. That's why Shell Lubrication Engineers have developed a control technique that "tailor-makes" the oil to fit the machine, the application, and the tool. Ask the Shell man for the details.

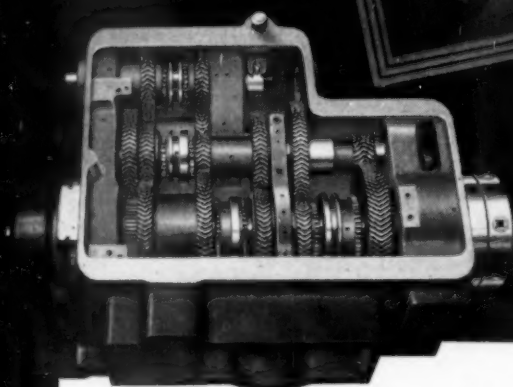
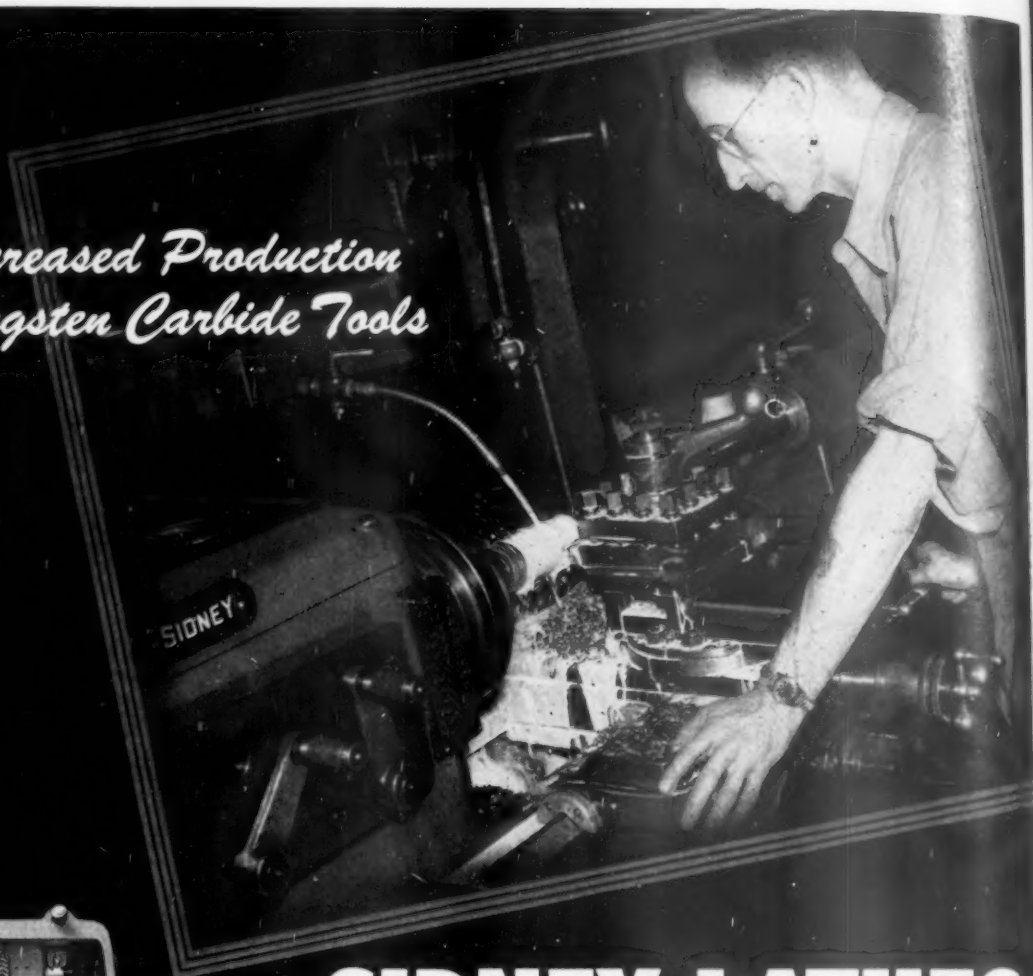
SHELL CUTTING OILS

FOR METAL CUTTING AND GRINDING



GRINDING

*For Increased Production
with Tungsten Carbide Tools*



SIDNEY LATHES

WITH CONTINUOUS
TOOTH HERRINGBONE GEARS



● To use cemented tungsten carbide tools to the fullest possible advantage the machine tool on which these cutters function must be designed and built to economically operate at increased cutting speeds. The machine must be free from vibration and interrupted tooth engagements with adequate power transmitted thru the gear system to the spindle.

All these requirements are met in the modern design, precision-built SIDNEY continuous tooth, 30° helix, herringbone transmission. Gears are in constant engagement, selective spindle speeds being obtained by sliding clutches of the internal and external involute

tooth type, with an absolute minimum of backlash, operating on ground multiple spline shafts. The inherent accuracy of the head-stock transmission means longer life and reduced tool costs.

Illustration shows a SIDNEY lathe in production on war work equipped with 4-way turret and carbide tipped tools taking deep cut at high surface speed on heat-treated chrome-nickel steel part.

To meet the urgent demand for increased production SIDNEY Lathes, of advanced design and smooth flow of power, merit your serious consideration.

Bulletins on all types are readily available.

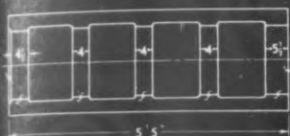
The SIDNEY MACHINE TOOL Company
Builders of Precision Machinery

SIDNEY

ESTABLISHED 1904

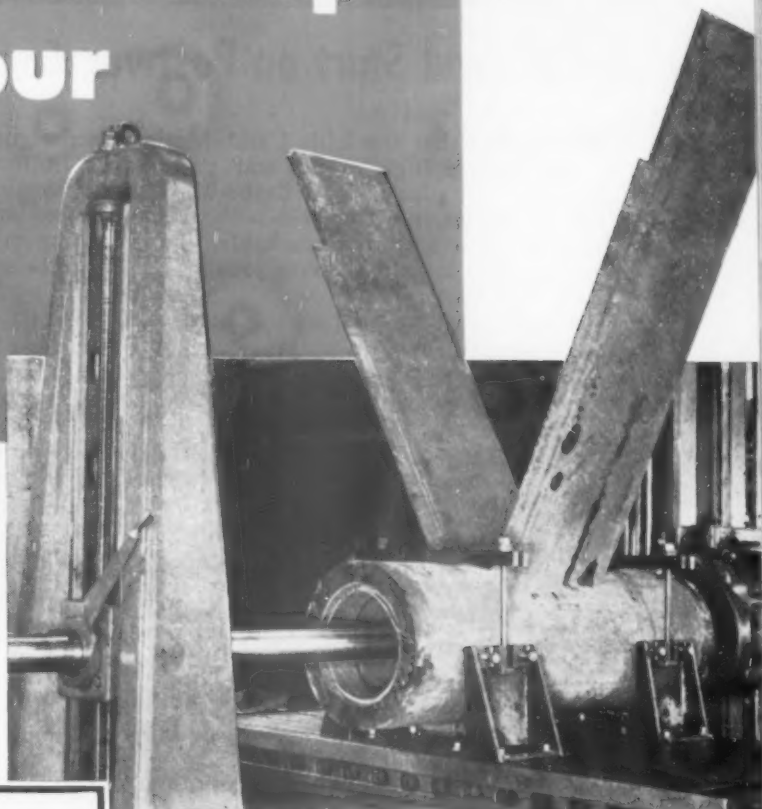
OHIO

How to Bore Deep Holes on Your Horizontal Boring Mill



Principal dimensions of propeller strut bored on G. & L. Table Type Machine

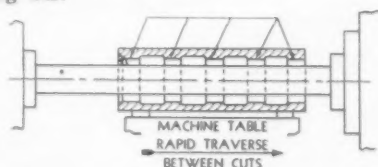
G. & L. Table Type Machine Does the Job with Simple Set-up and Tooling . . .



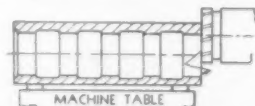
(Above) Operation view showing simplified method of setting up and clamping 8000-lb. steel weldment prior to machining.

OPERATIONS

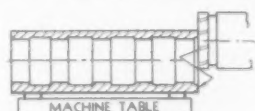
The cylinder is rough bored and face milled on both ends in two set-ups. Face milling operations are performed because the surface to be machined is $3\frac{5}{8}$ " wide. This surface if smaller could be machined by back-facing with the boring bar.



First Set-up—Weldment is loaded on machine as shown in the illustration above. The intermittent bores are then machined by feeding through each cut and applying the rapid traverse of the table in between cuts. Two rough boring cuts are performed. Subsequent finish boring



operations are performed after installation with portable boring equipment. The second operation in the first set-up consists of face milling the end. Milling is performed by utilizing the feed of both the machine headstock and table.



Second Set-up—The weldment is now turned 180° on the table and the opposite end face milled similar to the second operation in the first set-up.

● If you have occasional deep hole boring operations, with intermittent cuts, you will be interested in how this manufacturer simplified the job.

The large weldment weighs approximately 8000 lbs. and requires boring and face milling of both ends. Only rough boring operations are required. Note the simplicity of set-up. Details of the operation are shown at the left.

This is another interesting example of how G. & L. Horizontal Boring, Drilling and Milling Machines are used to perform an endless variety of machining operations. If you have any problems in connection with your Horizontal Boring, Drilling and Milling Machines, G. & L. engineers will be glad to work with you in finding the most practical solutions. You can use their experience without obligation.

Additional Data

...covering the complete line of Giddings & Lewis machines and time-saving accessories is included in this catalog. Write for your copy today—please indicate your business connection. Ask for Bulletin No. TE24.



GIDDINGS & LEWIS MACHINE TOOL CO

132 DOTY STREET, FOND DU LAC, WISCONSIN



Get a Head Start on Postwar Competition, Right Now!

● It's true that the Lipe Carbo-Matic was designed especially for high-output war production. In hundreds of war plants, Lipe Carbo-Matics are "hogging off" tough armament steels with an ease, speed and precision that's truly remarkable. They're doing proportionately faster and finer jobs on softer steels and on non-ferrous metals.

But when D-day arrives . . . when cost competition is resumed once more . . . that's when the owners of Lipe Carbo-Matics are going to recognize a completely new set of values in these high-speed, high-precision lathes. For that's when savings in tool wear and tool breakage are really going to show up. And that's when reduced scrap losses and fewer rejects are going to be determining factors in the price of your finished products, and in the market which they enjoy.

LIPE-Rollway Corporation
Syracuse, N. Y.

Thousands of worn-out and overaged tools are going to be scrapped and replaced after the war. Plan now to be at the head of the list when postwar shipments start. Get a head start on competition by being first with production economies.

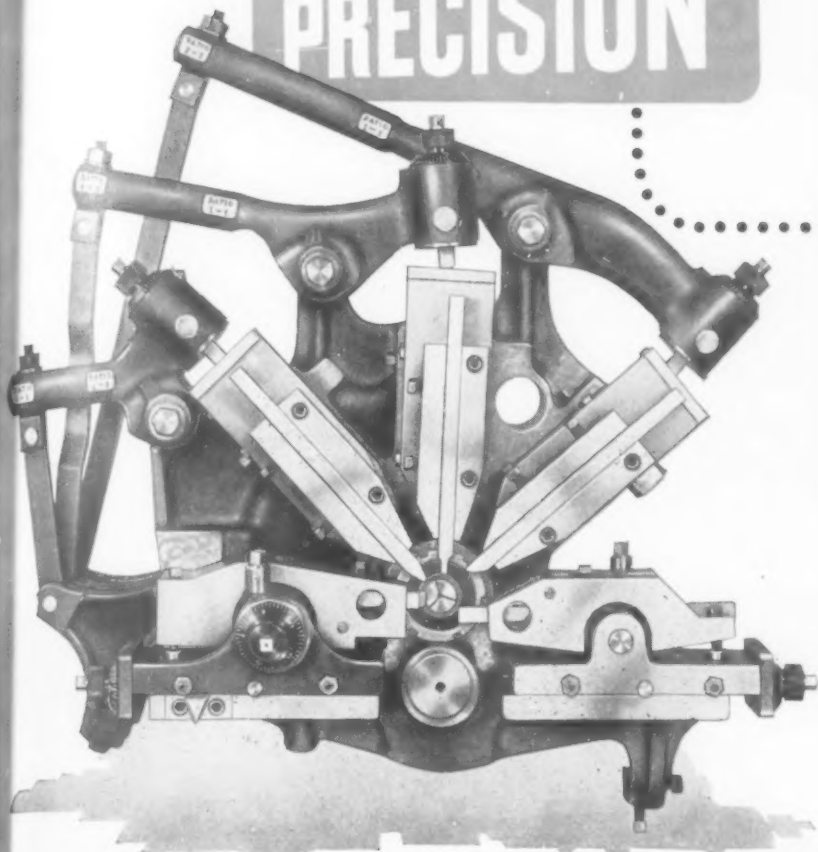
*Plan to Replace
Aged and Worn-out
Lathes with Modern
High-Speed*
**LIPE
CARBO-MATICS**



LIPE *Carbo-Matic* **LATHE**

One-Operation

PRECISION



Serving some of America's greatest precision-makers, including Norden, Kollsman, Sperry, Bendix and many others, the Ceco Automatic is revolutionizing the mass production of small intricate parts—cutting tool costs, speeding the set-up and producing *one-operation precision work* with amazing economy and efficiency.

ACTUAL SIZE



THIS BOMBSIGHT PINION SHAFT IS AN EXAMPLE OF CECO'S ONE-OPERATION, HIGH-SPEED PRECISION PRODUCTION

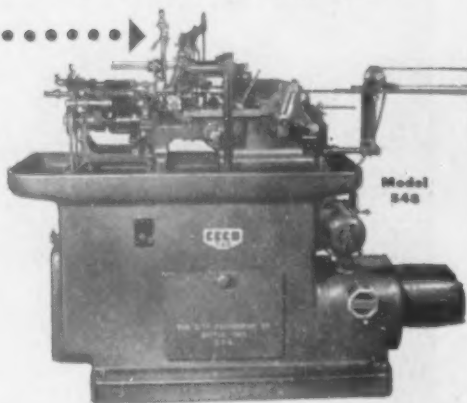
Produced by Ceco in *one operation* instead of three formerly required, and with single tip tooling, thereby eliminating form tools commonly used, is the Bombsight part reproduced above.

CECO

SWISS TYPE

Automatic

UNIVERSAL PRECISION SCREW MACHINES



Highlight Features!

BAR CAPACITY: $\frac{3}{8}$ " and $\frac{1}{2}$ "

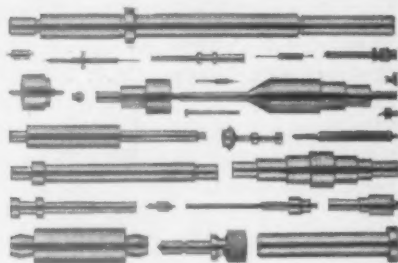
4 or 5 RADIAL TOOL SLIDES:

MAXIMUM TURNING LENGTH: 4" with flat cam.

MASTER SPEED RANGER: Varies Spindle speed from 675 to 7500 R.P.M. at the turn of a handwheel.

PRECISION ROLLER BEARING SPINDLE: Always in adjustment.

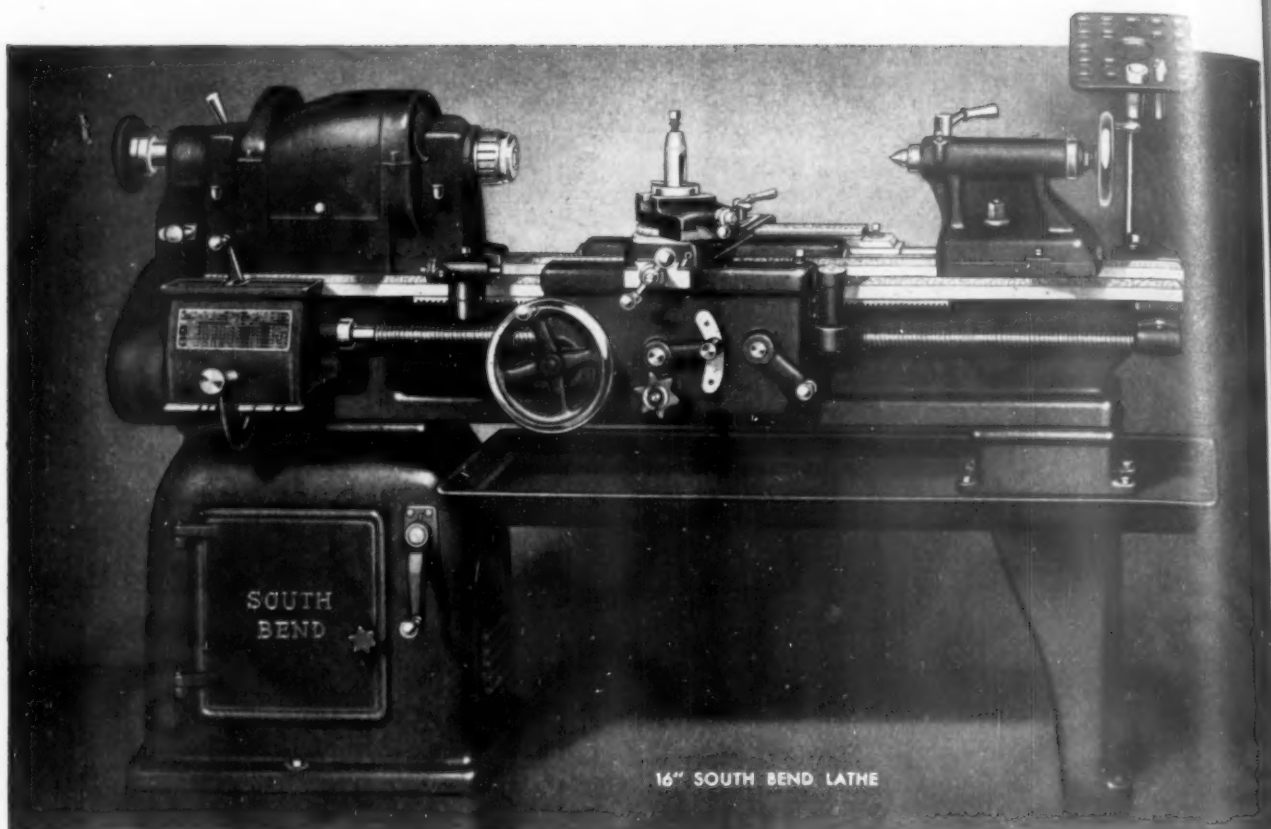
CONSTANT RISE FEEDING MECHANISM gives extreme feeding accuracy.



Shown on this page are a few of the hundreds of parts Ceco produced in *one operation* with extreme accuracy and high finish. Odd shapes and multiple diameters, also complicated forms, including tapers, bevels, radii, etc., are Ceco-produced with single tip tools. Result—quick set-up, low cost, and faster high precision production of intricate parts. For information and literature write:

THE CITY ENGINEERING CO.
DAYTON, OHIO

Since 1909, Designers and Builders of Tools, Dies, Jigs, Fixtures, Gages and Special Machinery.



16" SOUTH BEND LATHE

SOUTH BEND LATHES FOR UNIFORM ACCURACY

SPECIFICATIONS of 16" lathe

Swing over bed	16 $\frac{1}{4}$ "
Distance between centers	33 $\frac{1}{2}$ "
Maximum collet capacity	1"
Hole through spindle	1 $\frac{3}{8}$ "
Thread cutting feeds (48) . 4 to 224 per inch	
Spindle speeds (8)	21 to 725 r. p. m.
Power longitudinal and cross feeds	48

BUY WAR BONDS



WAR PRODUCTION demands uniform accuracy. The loss of time or the waste of scarce strategic materials because of variations in machining cannot be tolerated. There is no place in our war production plan for equipment that cannot be relied upon to maintain the required tolerances.

Sound design and careful workmanship give South Bend Lathes the dependable precision that assures uniform accuracy at all times and speeds-up production on the most exacting machining operations.

South Bend Engine Lathes and Toolroom Lathes are made with 9", 10", 13", 14 $\frac{1}{2}$ ", and 16" swings, with bed lengths from 3' to 12'. The Turret Lathes are made with 9" and 10" swings. Write for Catalog No. 100-C in which they are all described and illustrated.

TRAINING HELPS — Sound films, books, wall charts, and bulletins are available for training lathe operators. Write for Bulletin No. 21-C.



SOUTH BEND LATHE WORKS
LATHE BUILDERS FOR 37 YEARS • SOUTH BEND 22, IND.



USE THE
Right
CUTTING TOOL



Selecting for each job the *right* cutting tool—right type, right form, right size—is the first rule of tool conservation. Proper choice in the first place, and care to see that this choice is maintained, will help produce more and better work.

NATIONAL



TWIST DRILLS
REAMERS, HOSS
MILLING CUTTERS
COUNTERBORES
SPECIAL TOOLS

TWIST DRILL AND TOOL COMPANY

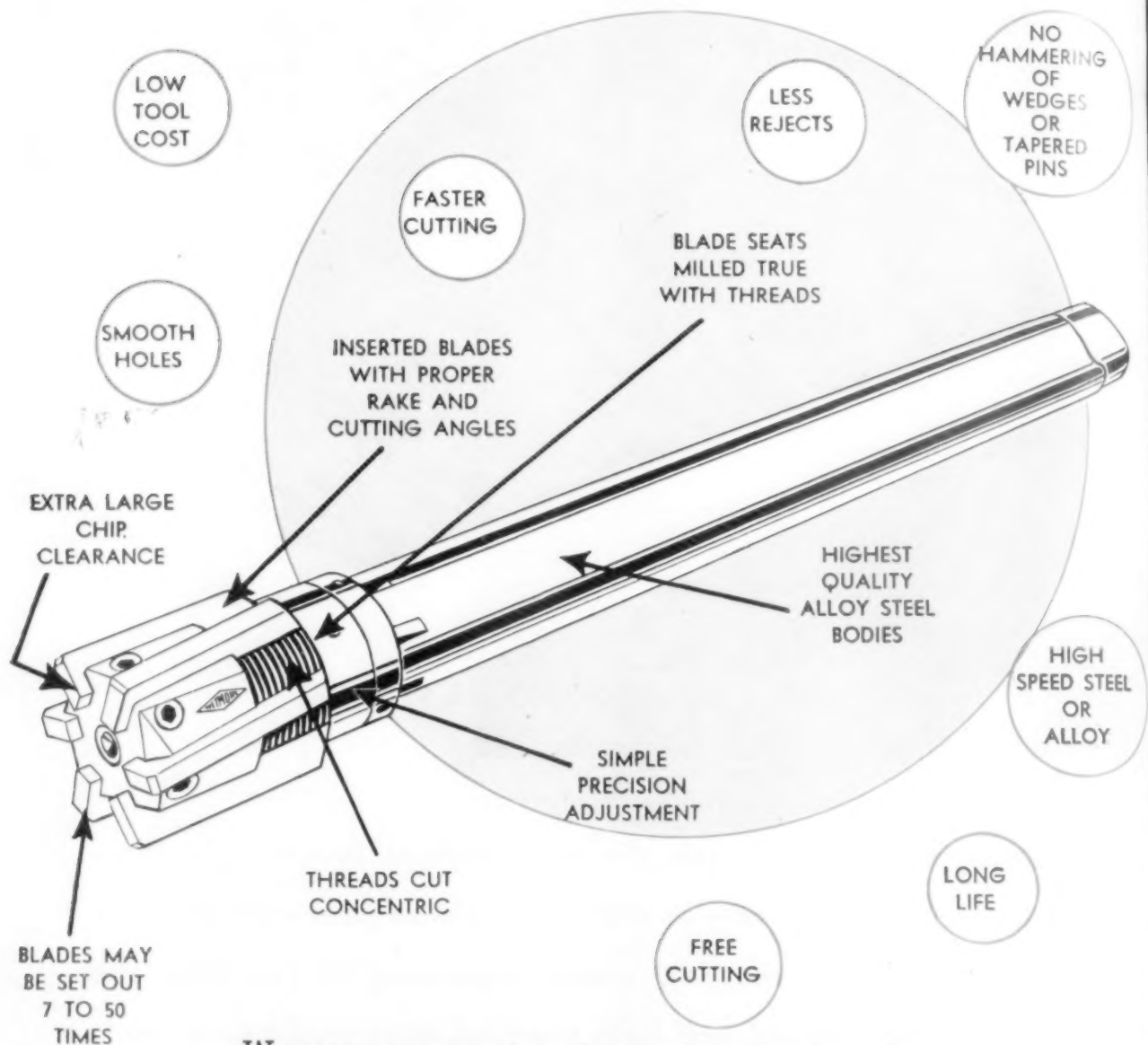
HOME OFFICE AND FACTORY—DETROIT, MICH.

Tap and Die Division—Winter Brothers Co., Wrentham, Mass.

Factory Branches • New York • Chicago • Cleveland • San Francisco • Distributors in Principal Cities

WETMORE FEATURES

For Better Reaming



WETMORE REAMERS have features that appeal to plant men charged with cutting costs, speeding production, saving time and producing precision holes with minimum spoilage.

Send for the new Wetmore Catalog—it will give you all specifications and details.

WETMORE REAMER CO., 418 N. 27th St., Dept. C, MILWAUKEE 8, WIS.



LUBRICATION ENGINEERING... LUBRICATION

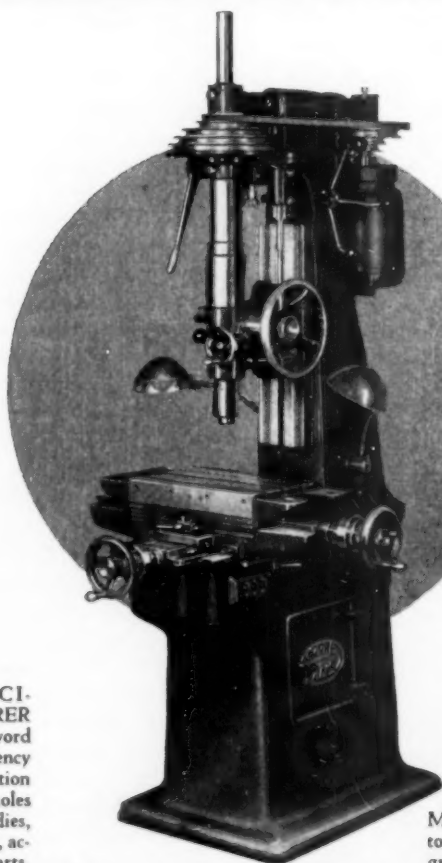
FEBRUARY, 1944

Oil is Ammunition . . . Use it Wisely

**STANDARD
SERVICE**



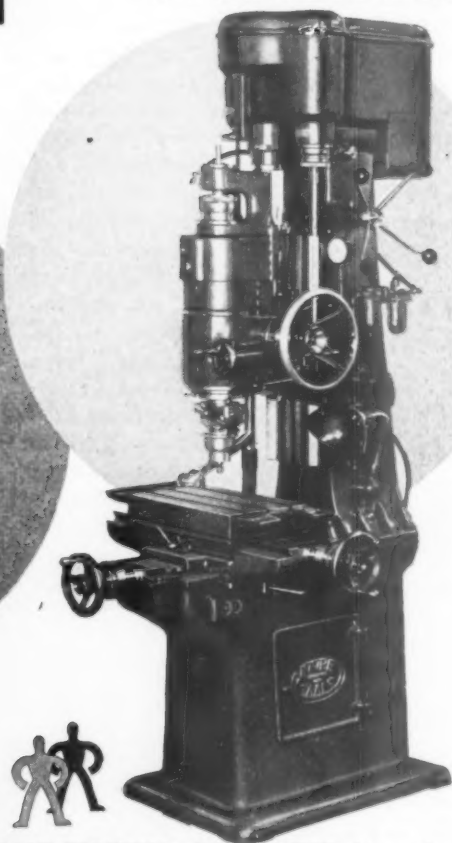
by
MOORE
"Partners in
Production"



MOORE PRECISION JIG BORER

—Here's the last word in accuracy, efficiency and ease of operation for the boring of holes in jigs, fixtures, dies, gauges and special, accurate machine parts.

The Moore Jig Borer is highly sensitive for holes of 1/32" diameter or less and yet rugged for heavy cuts up to 4 1/2". Operators can accurately spot, drill, ream and bore in one uninterrupted sequence with the Moore Jig Borer.



MOORE PRECISION JIG GRINDER—Here's the solution to the problem of correcting hardening distortions. The finish-grinding of straight and tapered holes to size and location is now possible in one-quarter the time formerly required—and with greater accuracy and fewer mistakes. The Moore Jig Grinder has a capacity to grind holes from 0.30" to 4", accuracy of screws of .00005" per inch and grinding speeds of 15,000 to 45,000 RPM.

☆ ☆ ☆ *M*ODERNIZE YOUR TOOLROOM OPERATIONS with these companion machine tools. Moore-produced lead screws, ground to an accuracy never achieved before, give the coordinate location method—features of both Moore tools—definite advantages over the graduated scale and size block methods of measurement.

Ask today for full details on the Moore Jig Borer and Jig Grinder.



MOORE SPECIAL

TOOL COMPANY INC.

740 UNION AVENUE, BRIDGEPORT 7, CONN.

ANOTHER EXAMPLE OF SAVINGS IN MACHINING TIME WITH W. F. and JOHN BARNES Unit-Type Machines



W. F. & John Barnes 9-Spindle Vertical Unit-Type Drilling Machine for machining crankcase intermediate rear part.

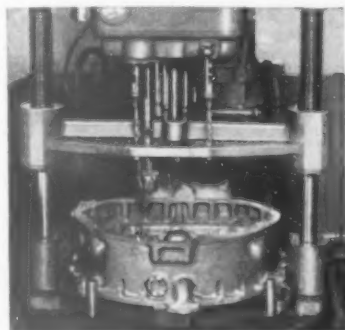
Operation Drilling 9 Holes in Crank Case Intermediate Rear Part

Former Machining
time 8.90 min.

W. F. & John Barnes
Machining Time ... 1.1 min.

Savings in
Machining Time ... 7.8 min.

● Machining time was reduced from 8.90 minutes to 1.1 minutes by combining drilling operations on one vertical W. F. & John Barnes Unit-Type Drilling Machine. The drilling of six .147" diameter holes, two $\frac{19}{64}$ " diameter holes and one $\frac{13}{64}$ " diameter hole was formerly performed on three conventional single spindle machines at a combined time of 8.9 minutes. By simultaneously drilling 9 holes on this W. F. & John Barnes 9-Spindle Machine not only was machining time reduced but additional savings in handling time were obtained. Similar W. F. & John Barnes Unit-Type Machines perform other operations on this part.



Set-up of W. F. & John Barnes 9-Spindle Drilling Machine for drilling 9 holes in crankcase intermediate rear part.

THESE FREE BOOKLETS WILL SHOW YOU HOW TO GET SIMILAR SAVINGS

SEE WHAT OTHERS HAVE DONE WITH SPECIAL MACHINE TOOLS

This set of five new bulletins will show you how W. F. & John Barnes has solved a wide variety of machining problems. Many machines, including deep hole drilling machines, unit-type special machine tools, and boring and honing machines, are illustrated and described. Write today for your free set. Ask for bulletins No. 244A.

HOW TO GET A SPECIAL MACHINE TOOL TO SUIT YOUR JOB

This set of eight bulletins will show you how you can get a practical solution to your metal working problems with W. F. & John Barnes Special Machine Tools. Each bulletin traces a machining problem from the original study of the part to the final machine design. Write for free bulletins No. 244B.



W. F. and JOHN BARNES

325 SOUTH WATER STREET • ROCKFORD, ILLINOIS, U.S.A.

Accurate Threads—

START WITH ACCURATELY ENGINEERED DIAMONDS...



For use on
EX-CELL-O
JONES & LAMSON
DALZEN
and other thread
grinders

★
For forming wheels
that grind
WHITWORTH
BUTTRESS
ACME
U S S
and any special form
groove or standard
thread.

TRU-THREAD DIAMOND DRESSING TOOLS ARE ACCURATELY ENGINEERED TO YOUR JOB

TRU-THREAD tools embody a radically new idea in the *manner* in which the diamond is used. This new idea employs the natural hardness of the uncut stone to achieve accuracy, speed, durability and economy that are truly remarkable.

TRU-THREAD tools cut faster and forms are obtained more quickly. They cut cleaner, leaving the grits sharp and the grain open, creating a free-cutting wheel that holds its form longer. Down-time is reduced, fewer dressings are needed and many more pieces are ground between dressings. Production boosts have gone as high as 500%—and grinding cost per piece has dropped as much as 75%.

There is a TRU-THREAD tool made to dress *any* form—straight line, radial or multiple and each with equal accuracy—the accuracy that is engineered into them in our plant.

These new tools are now being made and reserviced on a production basis, assuring you fast deliveries. Write, wire or phone.

WHEEL TRUEING TOOL CO.

3200 W. Davison Avenue

Detroit 6, Mich.

U. S. A. BOMBARDIER'S VIEW
OF AN ENEMY SHIP

HOW TO SOLVE

Operating Problems

with *Correct
Lubrication*



Let Bombsights Help You Choose Your Cutting Fluids!

A LEADING MAKER of U. S. A.'s bombsight
uses Socony-Vacuum Cutting and Sol-
uble Oils on all cutting operations.

When it comes to combining need for pro-
duction with need for preci-
sion, it would be hard to
find a tougher job than mak-

ing finely machined American bombsights.

The fact that Socony-Vacuum Cutting Fluids
are used on tough alloy steels in this job is an
important indication of the performance you
can expect from these high quality products.
Use them to secure fast-cutting, long tool life,
superior finish, maximum production.



SOCONY-VACUUM OIL CO., INC.—Standard Oil of N. Y. Div. • White Star Div. • Lubrite Div. • Chicago Div.
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CALL IN SOCONY-VACUUM

How to Get the Most Economical Solution to Your Turning Problem!

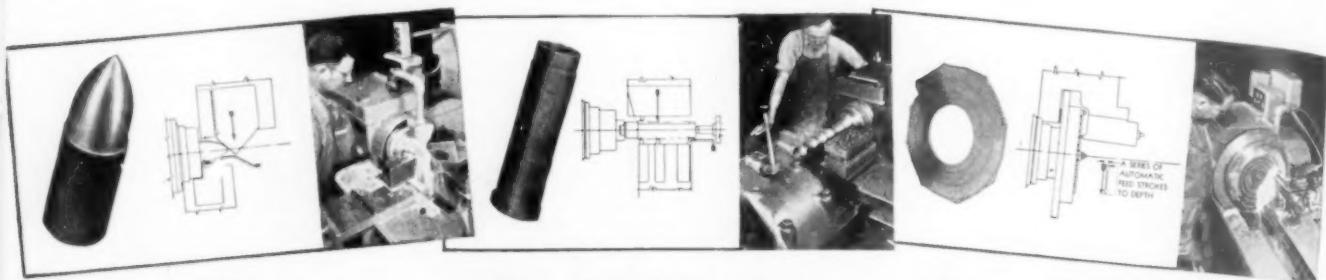
Whether it is a Mass Production ... a Short Run ... or a Special Turning Job, Sundstrand Engineers Can Solve It...

Whether your turning problem is a mass production job running into thousands of pieces...a short run of as few as 25 pieces...or a special turning job, Sundstrand Engineers will show you how it can be handled to advantage on Automatic Lathes with quick cycle changeover.

All of the advantages of multiple tool turning are available on both short run and mass production work with Sundstrand Lathes. To meet a wide range of

applications three models of Sundstrand Automatic Lathes are available. These standard models, furnished with either two or three tool carriages, can be made even more flexible and adaptable to additional jobs with several available auxiliary attachments.

Described here are three typical cases in which Sundstrand Engineered production assisted plant engineers in designing a tooling method which resulted in higher production and lower turning costs.



1 A Mass Production Job!

Turning 75 mm Armor Piercing Shot . . .

Starting from bar stock the Sundstrand Automatic Lathe contour turns and forms the nose of 75 mm shot. Highly skilled operators are not necessary in order to rapidly and accurately duplicate parts on a Sundstrand. Just load, unload, and press the machine starting lever...the front and rear tool slides will rapid approach, feed, rapid return, and stop, all timed and interlocked with the starting and stopping of the machine spindle and coolant flow. Oftentimes, one operator can run one or more machines, depending upon the cycle time.

2 A Short Run Turning Job!

Turning Time Reduced from 75 to 8 Minutes on Lots of 40 . . .

Due to the quick changeover features of the Sundstrand Automatic cycle, it is possible for this manufacturer to turn many of his jobs in lot sizes as low as 25. On one lot of 40 sleeves, his turning time was cut from 75 to 8 minutes. Other parts turned include sprockets, pulleys, gears, etc., with lot sizes of 25 to 100 pieces. Two Model 10 Sundstrand Automatic Lathes are used with one man operating both machines. Over 100 different short run jobs are turned on these machines.

3 A Special Turning Job!

Cutting Spiral Grooves in Cartridge Reels . . .

Sundstrand Engineers designed a number of special features and a unique tooling method for a Model 12 Sundstrand Automatic Lathe in order to provide a complete automatic cycle necessary for cutting a spiral groove on a cartridge reel. Because of the frailness of the part and the odd shape of the groove, it was not possible to cut this spiral groove to full depth in one cycle. The machine is arranged to automatically cycle 35 times and then stop. Tool is advanced .002" between each cycle so that a groove .070" deep has been cut at the end of the 35th cycle.



MORE TURNING FACTS... Get additional information on how you can turn both short run and mass production work faster in this free booklet. Ask for Bulletin No. 821.



SUNDSTRAND MACHINE TOOL CO.

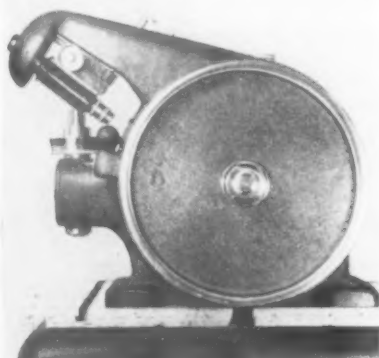
Rigidmills • Fluid-Screw Rigidmills • Automatic Lathes • Hydraulic Equipment • Drilling and Centering Machines • Special Milling and Turning Machines

"30 times more accurate"

For the past few years we at Vinco have been producing the Optical Master Inspection Dividing Head using the finest material and the best possible methods and workmanship in its production. We are informed, on high mathematical authority, that our Dividing Head is thirty times more accurate than others being used in inspection. The spindle in each instrument is carefully inspected and checked. The spindle run-out is guaranteed to within twenty-five millionths of an inch, total indicator reading; the average run-out however being approximately fifteen millionths. The Dividing Head is guaranteed accurate to within two seconds of arc, but experienced inspectors are able to match the lines viewed through the microscope to within $12\frac{1}{2}$ millionths of an inch or $\frac{1}{2}$ second of arc. It can therefore be seen that this Dividing Head operated properly is capable of great accuracy. Send for our folder.

VINCO CORPORATION
8857 SCHAEFER HIGHWAY
DETROIT 27, MICH.

SALES OFFICES:
NEW YORK
CHICAGO



MILLIONTHS OF AN INCH FOR SALE BY VINCO

Semi-Automatic Hydraulic Spline and Gear Grinder • Optical Master Inspection Dividing Head • Involute Checker • Angle Tangent to Radius Dresser • Index Plates • Precision Vises • Sine Bars • Straight-side Spline, Serration Spline, Involute Spline and Helical Spline Plug and Ring Gages • Thread Ring Gages and Masters • Spur and Helical Master Gears • Munition Gages • Propeller Hub Gages • Built-up and Special Gages • Gear Rolling Fixtures • Spline and Index Fixtures • Hydraulic Power, Control, Utilization and Distribution Units • Engineering, Design and Development

There are many GOOD THINGS AHEAD...

Soybeans will certainly be one of the country's important crops in the future. A single acre of land devoted to them will produce about seven times as much protein as it would if planted to corn for the feeding of hogs.

The war has checked the spread of quick-freezing locker plants which were spreading across the country from the farming states at the rate of about fifty new plants each month. A million patrons are already withdrawing two million pounds of food from their lockers daily. Home-sized quick-freezing units will probably be combined with mechanical refrigerators in after-the-war models.

The fluorescent tube may have many uses besides those already familiar. Inks that show under ultra-violet light are already in use to mark laundry, and are being tried out in hospitals for the identification of babies. Fluorescent materials help in the detection of theft and sabotage, and in the detection of altered documents. Fluorescent lighting distinguishes between butter and margarine, determines the freshness of eggs and nuts, or the adulteration of coffee, lard and olive oil. Experts can even tell, with its help, from what flowers a sample of honey has been made.

Powdered glass is being pressed into shapes and fused by heat in a manner similar to the technique used for powdered metals.

A machine is reported in which a photo-electric cell scans a drawing and operates a machine that produces the part shown in the drawing.

Cotton, laminated with thermo-setting plastics, is being tried as a substitute for sole leather... semi-flexible, water repellent, and similar in appearance to leather, but longer wearing.

New "rare-element" glass that contains no sand makes optical glass for camera lenses with twice the speed of any former lens.

A new method of cutting metal uses slightly worn band-saw blades run at approximately ten thousand feet per minute. The high speed of the saw actually melts the metal in its path.

Baking dishes can now be made of special paper that resists heat to 350 degrees.

The photo-electric cell (or electric eye) was first introduced to the public as an automatic door-opener. Now it sorts fruit, smoke and fire, levels elevators, records automobile speeds, counts pills, matches colors, sorts merchandise, turns on lights, measures machined parts, detects flaws in metal and is the heart of television. Its use has only begun.

Backyard gardeners will be pleased to know that experiments are being made with high-frequency currents to kill insect pests in the ground.

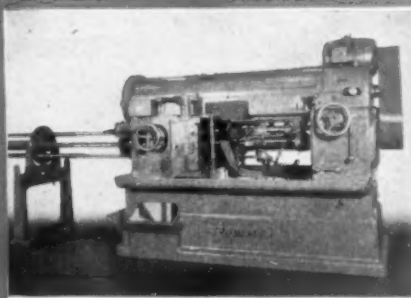
An immediate post-war demand is expected for two million one-hundred thousand automobiles, one-million five-hundred thousand mechanical refrigerators, one-million two-hundred thousand washing machines, one-million two-hundred thousand radios, nine-hundred thousand electric irons, and six-hundred thousand electric sewing machines.

The Basic Magnesium, Incorporated, plant near Boulder Dam, largest single electrical installation in the country, uses eighteen million dollars worth of silver in place of copper to carry its current.

A patent has been issued for a method of transcribing eight hours of continuous reading by variably magnetizing a spool of fine wire the size of an ordinary spool of cotton. With this wire in a radio-like machine, a housewife could attend to her domestic chores and listen to the reading of an entire book at the same time.

A new camera takes three million pictures in a single second.

*If you are looking ahead
you will be interested in production like this*



This 4 1/4" bronze valve stem is produced on the 6-spindle Conomatic in nine seconds — nine seconds for eleven operations including four forming cuts, four cuts with roller turners, two threading operations and cutting off — all to close tolerances.

This is real production — the sort of production that is winning the war — the sort of production that you will need in your plant to meet competition when the war is over.

CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U. S. A.

FOR TOOL ROOM SURFACING



The Norton Hydraulic Surface Grinder

Form 954-TE gives full information on the Norton 6" Surface Grinder — write for a copy.

POSITIVE accuracy with versatility and adaptability are combined in the Norton 6" x 18" Hydraulic Surface Grinder. Its time-tested workmanship, built-in stability and convenient adjustments and controls make it the ideal toolroom surface grinder for your experts in turning out those fussy precision jobs.

The Norton 6" Surface Grinder is positively accurate enough for your finest toolroom work — is adaptable to production line jobs. Investigate. Norton representatives and engineers are ready to give you every possible assistance in solving your grinding problems.

Norton Company, Worcester 6, Mass.

New York Chicago Detroit
Cleveland Hartford



NORTON GRINDERS
and Lappers

GET THE MOST FROM YOUR POWER HACK SAW MACHINES



Write for

PRODUCTION CALCULATOR



The W. O. Barnes Company is glad to co-operate with the War Production Board in promoting tool conservation. Barnes factory trained service men are available in helping to solve blade problems.

An indispensable help for cutting over eighty different types of metal. Use BARNES blades for increased production. Write W. O. BARNES CO., INC., 1295 Terminal Ave., Detroit (14), Michigan

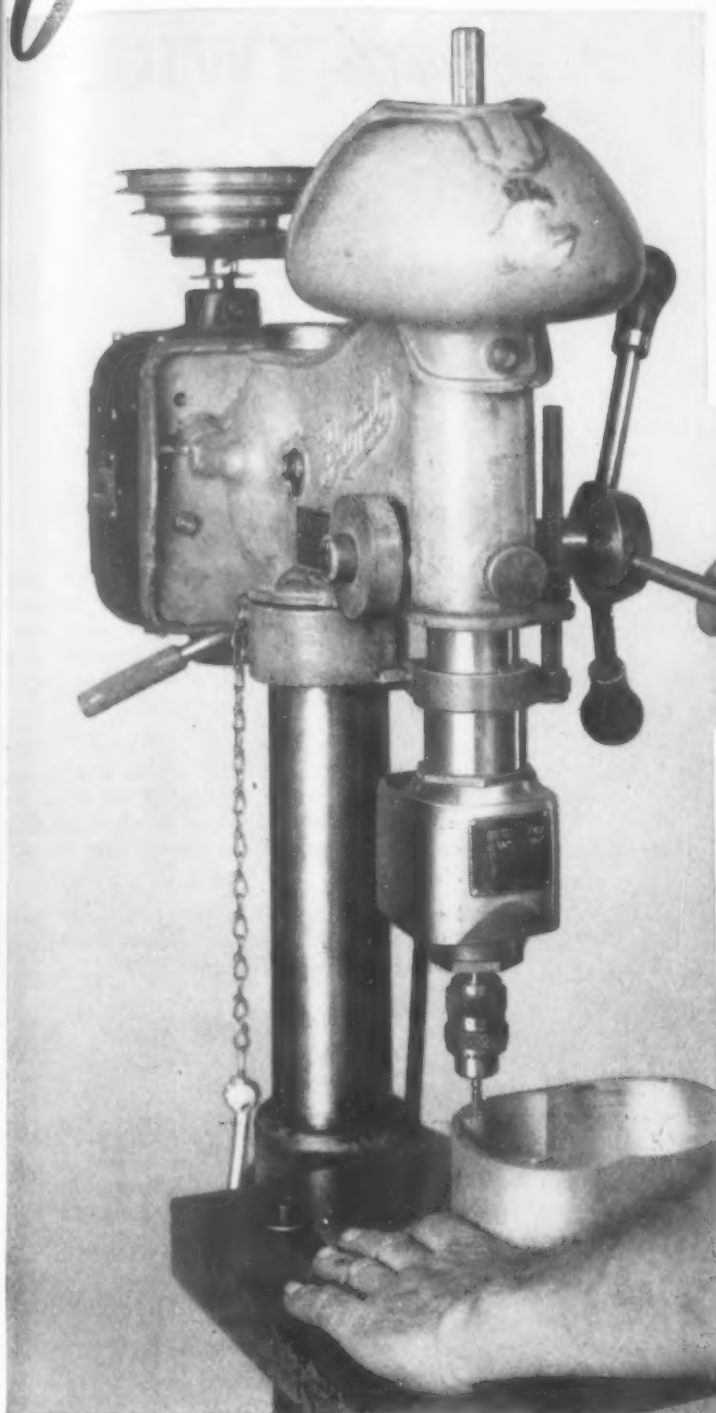


Jarvis HIGH SPEED TAPPERS

Jarvis Tapping Attachments are built for high speed production, and long dependable service.

Famous for long tap life and extreme accuracy.

Send for Catalog MFTI



Built-in Type
JARVIS
TAPPING
ATTACHMENT

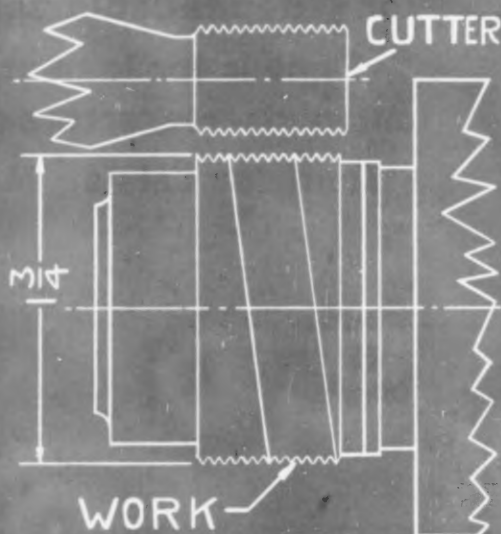
For Accuracy and Precision Depend on Jarvis

THE CHARLES L. JARVIS CO., MIDDLETOWN, CONN.

TAPPING ATTACHMENTS • FLEXIBLE SHAFT MACHINES • GROUND ROTARY FILES

PLAN-O-MILL

*Does it... with TWICE
the Speed—
HALF the
Manpower*



16 PITCH
.375 LEAD



We've said it before. We say it again. Obsolete machines are wasteful.

Notice the relatively small, solid, low-cost cutter used to mill this external thread. Plan-O-Mill rapidly and accurately mills this sextuple thread in a single revolution of the milling cutter around the work!

For thread milling, for cylindrical forming—internal or external—Plan-O-Mill delivers outstanding accuracy, superior finish, and most profitable production. One operator handles two or more Plan-O-Mills.

Replace those obsolete machines with Plan-O-Mills! Contact your machinery dealer or write direct.

"FIRSTS"
WITH
PLAN-O-MILL

- First* to install General Electric's remarkable new Thy-mo-rol electronic feed control!
- First* planetary to mill external threads with standard multiple thread cutter!
- First* planetary to coordinate feeds and speeds!
- First* to provide absolute control of feed-in!

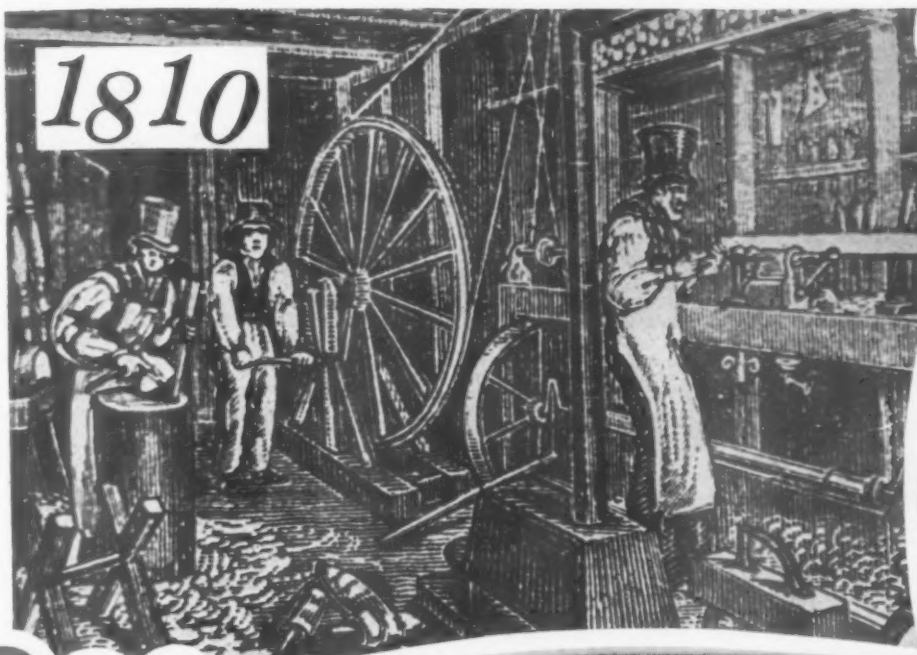
PLAN-O-MILL
CORPORATION

1511 East Eight Mile Road • Hazel Park, Michigan

THE TOOL ENGINEER

Just imagine / production then

1810



Bettmann Archive

. . . *And Now!*

ABOVE is an interior view of an American Machine Shop in the earlier part of the 19th century. Eli Whitney's Rifle Shop must be pictured as being equipped with similar machinery and tools. Note the motive power and work being done by hand. Compared by the standards of today, there just was no such thing as production. Perhaps the greatest single improvement over the old methods was

the advancement in the use of air and hydraulics . . . the application of air or hydraulic pressure for the operation of chucks, work holding and ejecting devices, assembling presses and many other labor saving devices. Let "LOGAN" Engineers make recommendations on modernizing your plant with the application of "LOGAN" Air and Hydraulic Equipment.

LOGANSPORT MACHINE, INCORPORATED
 902 PAYSON ROAD LOGANSPORT, INDIANA
 Manufacturers of Air and Hydraulic Devices, Chucks, Cylinders, Valves, Presses and Accessories



YOUR POSTWAR PLANNING

While postwar plans cannot now be precisely determined, it is clear that one need is for improved products to keep manufacturing at a high level and provide the work necessary to maintain the American standard of living.

After the war, business must be won against stiff competition in practically every field. Present models of many machines will be made obsolete by others with important improvements that cannot be ignored.

The exceptional versatility of Vickers Hydromotive Controls provides unusual opportunities to the machine designer . . . opportunities for far-reaching improvement in the important fields of better con-

AND **VICKERS** **HYDROMOTIVE** **CONTROLS**

trol—higher production rates—wider utility—greater safety—elimination of operational difficulties.

Your postwar planning is undoubtedly now underway. Vickers Application Engineers will welcome opportunities to cooperate with you.

VICKERS Incorporated • 1416 OAKMAN BLVD. • DETROIT, MICHIGAN

Application Engineering Offices: CHICAGO • CLEVELAND • DETROIT • LOS ANGELES • NEWARK • ROCKFORD • TULSA • WORCESTER

Representative of More than 5,000 Standardized Vickers Units
for Every Hydraulic Power and Control Function



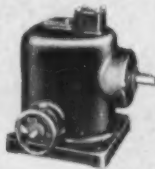
CONSTANT DELIVERY
PUMPS



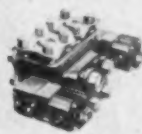
CONTROL
ASSEMBLIES



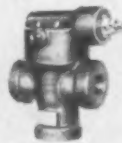
FLUID
MOTORS



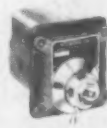
VARIABLE DELIVERY
PUMPS



DIRECTIONAL
CONTROLS



PRESSURE
CONTROLS



VOLUME
CONTROLS

Ex-Cell-O machine illustrated is an opposed Style 58 two-way machine arranged with six boring spindles at each end for finish boring, counter-boring and facing the gear holes in an aluminum supercharger cover. All spindles operate simultaneously, finishing the holes within .0005" at a highly satisfactory production rate. The units have 20 inches of table travel and 15 3/4 inches between the ways. Each spindle is individually adjustable for quick setting. In this particular application all centers are set to a master gage, which, in effect, is a master for the part itself.



XLO

EX-CELL-O for PRECISION

INCREASING PRODUCTION . . .

with new economy!

Ex-Cell-O Unit-type Precision Boring Machines Bring Added Practical Features

Ex-Cell-O has developed standard boring units, each a complete machine in itself, yet by means of heavy flanges and bolts these units can be bolted singly or in multiples to a stationary center section, resulting in a multiple precision boring machine. Note these advantages:

It is still a precision boring machine. Bores may be finished in tenths of thousands as before, yet units may be mounted in multiples and at angles, all operating simultaneously toward the center section.

Because all units may operate simultaneously, production is considerably increased on many parts.

The unit-type construction allows for salvage of all but the fixtures in case of part changes. It is possible and

economical merely to remove and replace the entire center section. This means a flexible machine on which maximum production can be obtained while the machine is set up.

Each way or unit has two feeds and a dwell in forward and reverse direction, and each can be controlled individually or by a central control button in conjunction with all other units hooked into the electrical panel. It is completely automatic except for loading and unloading.

More than most semi-special machines, this Ex-Cell-O machine incorporates desirable features in flexibility and production, for war work today and peacetime products tomorrow.

EX-CELL-O CORPORATION • DETROIT 6, MICH

Ex-Cell-O has just printed a new folder on Unit-type and other Way Machines. A copy is yours for the asking. Send to Ex-Cell-O Corporation, Detroit 6, Michigan, and specify Bulletin 31631.

PRECISION THREAD GRINDING, BORING AND LAPPING MACHINES • SPECIAL MULTIPLE WAY-TYPE PRECISION BORING MACHINES • SPECIAL MULTIPLE PRECISION DRILLING MACHINES
BROACHES • GRINDING SPINDLES • HYDRAULIC POWER UNITS • DRILL JIG BUSHINGS
TOOL GRINDERS • CONTINENTAL CUTTING TOOLS • DIESEL FUEL INJECTION EQUIPMENT
PURE-PAK CONTAINER MACHINES • R. R. PINS AND BUSHINGS • PRECISION PARTS

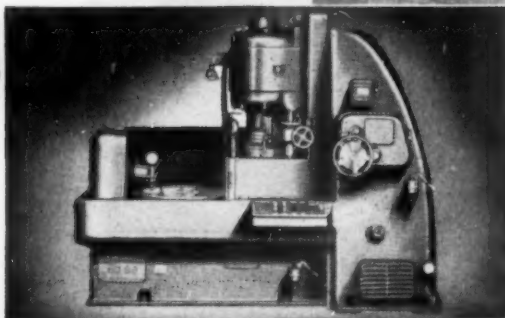


FIT THE MACHINE TO YOUR WORK

(Not Your Work to the Machine)

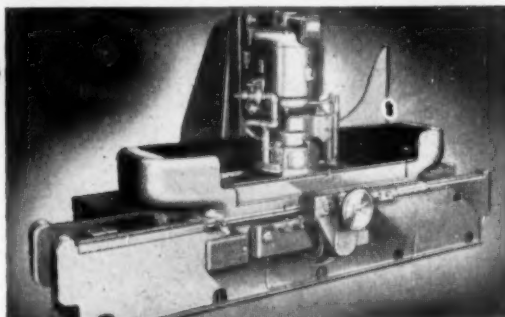
ROTARY TABLE TYPE SURFACE GRINDER

Grinds several relatively small pieces simultaneously at a high rate of production. Also efficient on single pieces.



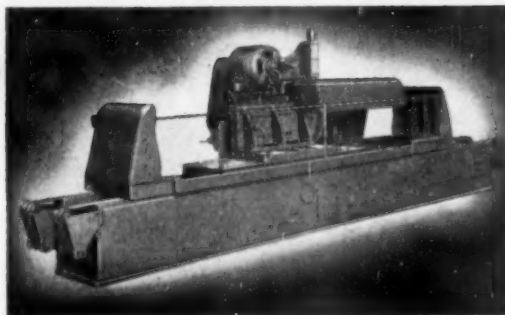
RECIPROCATING TABLE TYPE SURFACE GRINDER

Principally used for grinding long, narrow pieces singly or in groups.



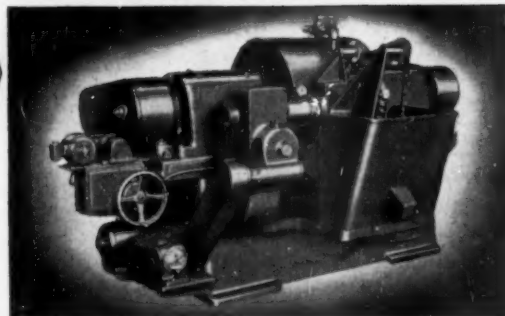
HYDRAULIC TRAVELING TABLE FACE GRINDER

A new, practical, time- and money-saving method of machining quality finishes on a wide variety of work.



DOUBLE SPINDLE DISC GRINDER

For high-speed grinding of two opposite parallel faces at the same time.



PEAK surface grinding efficiency comes only from using the right type of grinder for the job. Too often a compromise results in unsatisfactory production rates, difficulty in obtaining specified finishes, unnecessarily high grinding costs and delayed deliveries. Why not place the responsibility of determining just which type of surface grinder will most efficiently handle your work in the hands of Hanchett engineers? They are in a position to give you unprejudiced judgment because Hanchett builds a complete line of surface grinders of all types.

Write today — ask
for Catalog No.
170 T-4



IF IT'S A FLAT SURFACE—THERE'S A HANCHETT TO GRIND IT

HANCHETT MANUFACTURING CO.
BIG RAPIDS, MICHIGAN U.S.A.

Are you planning New Products

after the War?

YOUR new product for postwar may be "back of the screen" or out in the open—in blueprints on the board or working models under test. Or, the "new products" may be your former lines brought up-to-date. Whatever your plans, you can be sure of this:

The lower your buying costs, the lower will be your producing costs. And in peacetime just as now you will *keep on* saving money by purchasing from your ♦ Industrial Supply Distributor—using him as your

central source for all materials and parts, instead of scattering your orders among the manufacturers.

Today *and* tomorrow—before you order Cle-Forge High Speed Drills, Peerless High Speed Reamers, or other supplies—check with your Industrial Supply Distributor.

He probably can send what you need from stock—or already has it coming in. It saves your time—it helps keep your production rolling at top schedules—to

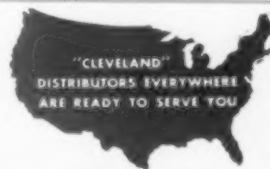
Telephone your ♦♦♦ **FIRST!**



The **CLEVELAND**

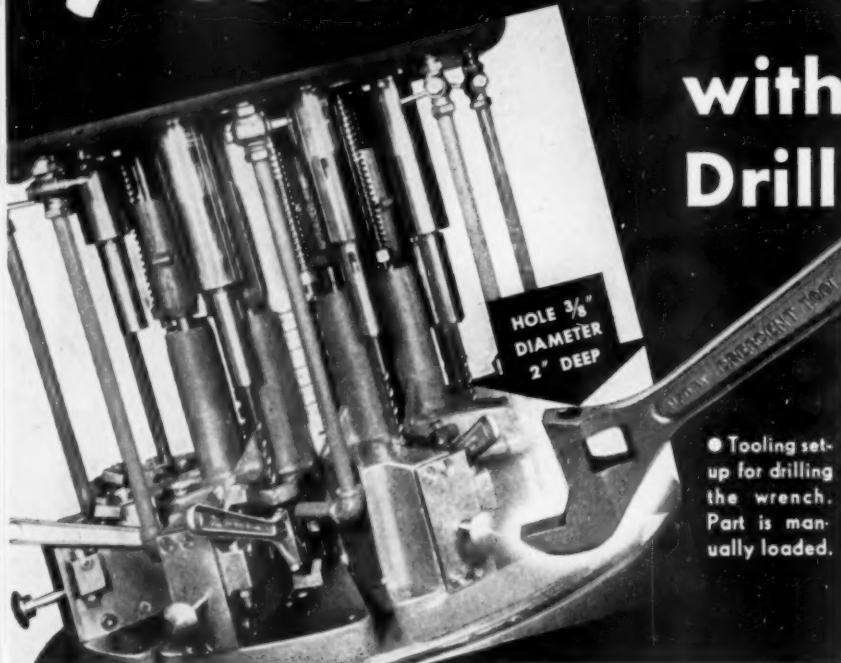
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1242 EAST 49th STREET
CLEVELAND

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6315 SECOND BLVD. DETROIT LONDON - E. P. BARRUS, LTD. 35-36-37 UPPER THAMES ST. E.C.4



Production Doubled

with a *Roto-Matic*
Drilling Machine!



● Tooling set-up for drilling the wrench. Part is manually loaded.

200 More Wrenches Per Hour with this Continuous Drilling Method

Over six 6-inch wrenches per minute — 400 per hour — were obtained by this manufacturer with the Roto-Matic Drilling Machine, with only one operator. Previous production, using a six-spindle conventional gang drill, was 200 wrenches per hour. The operation consists of drilling a $\frac{3}{8}$ " dia. hole by 2" deep.

This is just one of many Roto-Matic installations which is setting outstanding production records throughout the metal working industry. Perhaps you can obtain similar or better performance through the application of this principle to your drilling. Our engineers will be glad to work with you in adapting this high production drilling machine to your work. Call on them without obligation.

What the Roto-Matic Principle is . . .

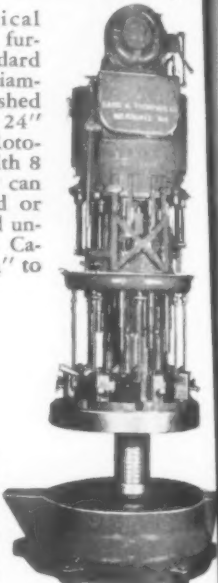
The Roto-Matic Drilling Machine is not an indexing type machine. The drills and work rotate continuously while the operator loads and unloads as the work passes the loading station. Feed to the spindles is obtained through an adjustable cam. The machine can be furnished in both vertical and horizontal models and in addition to drilling, the Roto-Matic principle can be applied to milling, reaming, spinning, counter-boring, spot-facing, balancing correction drilling and similar operations. Investigate the application of this machine or a similar machine to your work today.



Davis & Thompson Company
M I L W A U K E E • W I S C O N S I N

The *Roto-Matic* ... A Basically Standard Machine for High Production Drilling or Reaming . .

The Roto-Matic Vertical Drilling Machine is furnished in three standard basic sizes. The 36" diameter Roto-Matic is furnished with 12 spindles. The 24" and 18" diameter Roto-Matics are furnished with 8 spindles. The machine can be provided with hand or automatic clamping and unclamping of the work. Capacities in steel from $\frac{1}{4}$ " to 2" diameter.



Basic Davis & Thompson Roto-Matic Drilling Machine. Only fixture and tooling are the necessary special engineering required to adapt this machine to an endless variety of work.

Readily Changed from One Job to Another . . .

The spindle feed lengths are governed by cams which can be changed over from one job to another with a minimum of down-time. This makes it possible to run several jobs of moderate lot sizes over the Roto-Matic and increase production over conventional drilling machines.

A "Pace-Setter" on the Production Line

Since the work is in constant rotation and set at a definite feed rate, the production is pre-determined and the operator need only to unload and load the work as each spindle passes the loading station. This eliminates unnecessary delays in the loading station which are often common with conventional indexing type drilling machines.

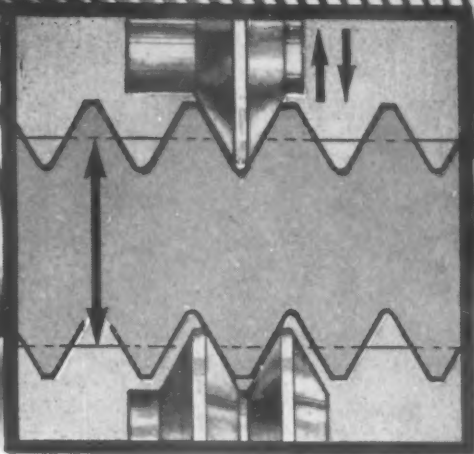
Free- This booklet contains other examples of Roto-Matic Solutions, and other high production machines. Ask for Bulletin No. TE-244.



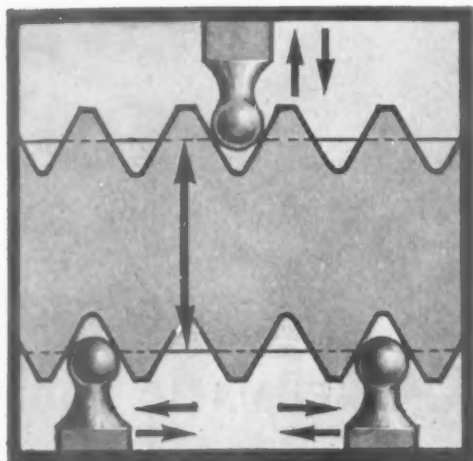
A FASTER Way to Inspect

DITCH DIAMETERS

Positively,
More Accurately
and to closer
tolerances



MODEL 45B-100. The upper, sensitive roller contact actuates the Dial Indicator.



MODEL 45B-80. The upper, sensitive ball contact actuates the Dial Indicator. Both lower ball anvils float sidewise independently to compensate for any variation in lead.

TWO FULL COLOR FILMS (With Sound)

No. 1 DIAL INDICATORS

No. 2 DIAL INDICATOR GAGES.

20 minutes each. For instruction and training.
For showing write →

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PROVIDENCE 1, RHODE ISLAND

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FEDERAL

PRECISION MEASURING

INSTRUMENTS

FEBRUARY, 1944





This full 1/4-inch capacity drill Model 101 with plastic housing and handle weighs only 1 lb. 9 oz. — one of the newest additions to the ARO line.

Speed the Attack WITH **ARO** PNEUMATIC TOOLS

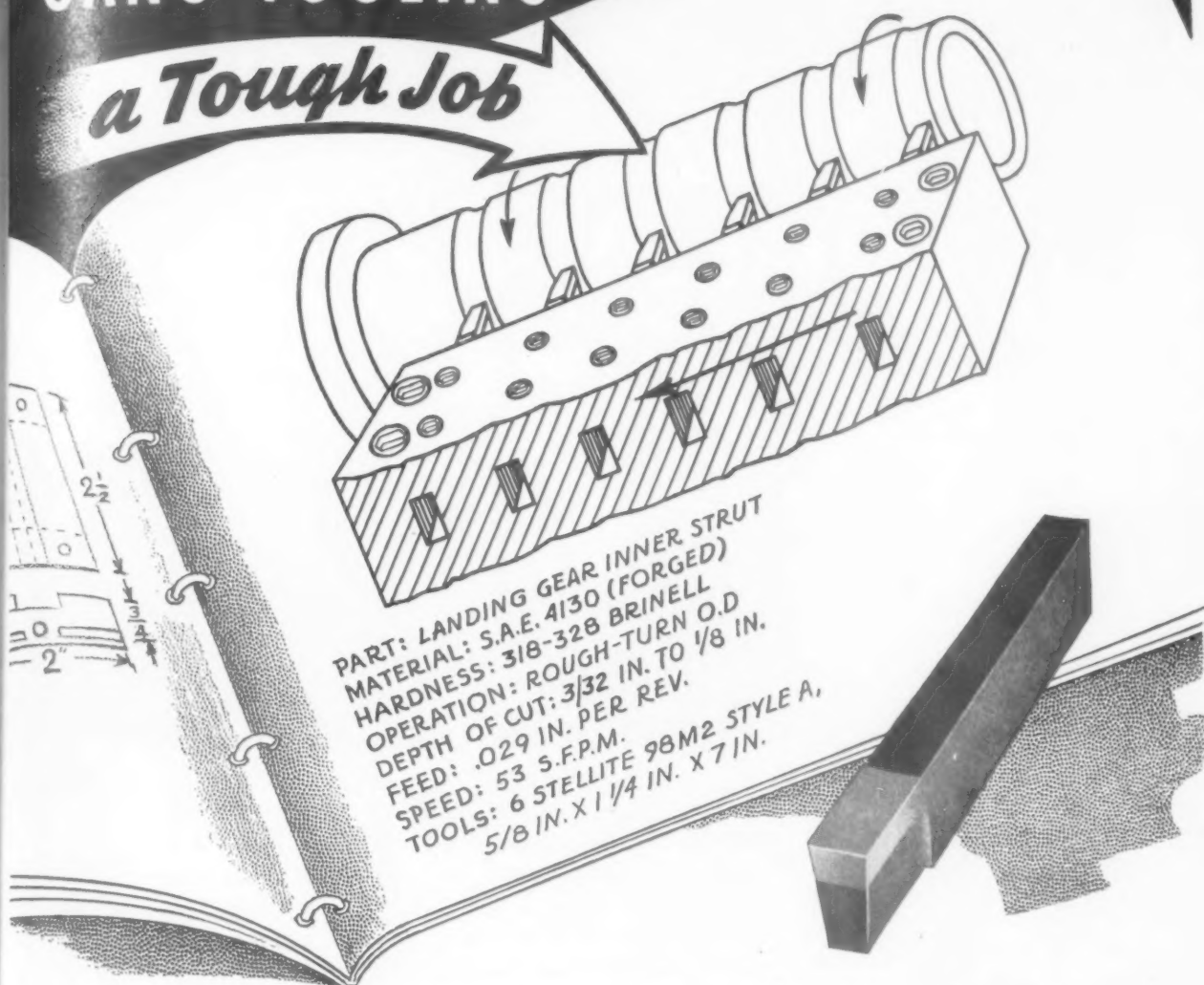
● Help your production lines send more "greetings" like this to Tojo and Hitler—by speeding up small tool jobs with ARO Pneumatic Tools!

ARO Engineering has packed tremendous power into these surprisingly small units. ARO Tools step up efficiency, cut down fatigue...for drilling, nut-setting, screw-driving, grinding, and countless other jobs. Simple in design...rugged...dependable...stall-proof. Ideal for women! Ask ARO Field Engineers to help solve your problems requiring special or standard tools. Write for new catalog. The Aro Equipment Corporation, Bryan, Ohio.



GANG TOOLING

a Tough Job



... for *FASTER* aircraft production!

Gang-tooling, fully utilizing the power of the machine tool . . . results in faster production of machined parts. This method is used with Stellite standard tools, as sketched above, to speed up the rough-turning of the O.D. of inner struts for aircraft landing gear . . . struts made of forged S.A.E. 4130 steel with a hardness of 318 to 328 Brinell.

Total length of the surface to be machined

is 19 1/2 in. Since six tools are used simultaneously, each tool cuts a distance of 3 1/4 in.

Stellite tools today are standard on this and many other high-production steel machining jobs because they can be depended upon to maintain the required production at low cost per piece machined.

Write for the Stellite 98M2 Price List.

BUY UNITED STATES WAR BONDS AND STAMPS



HAYNES STELLITE COMPANY

Unit of Union Carbide and Carbon Corporation

New York 17, N. Y.



Kokomo, Indiana

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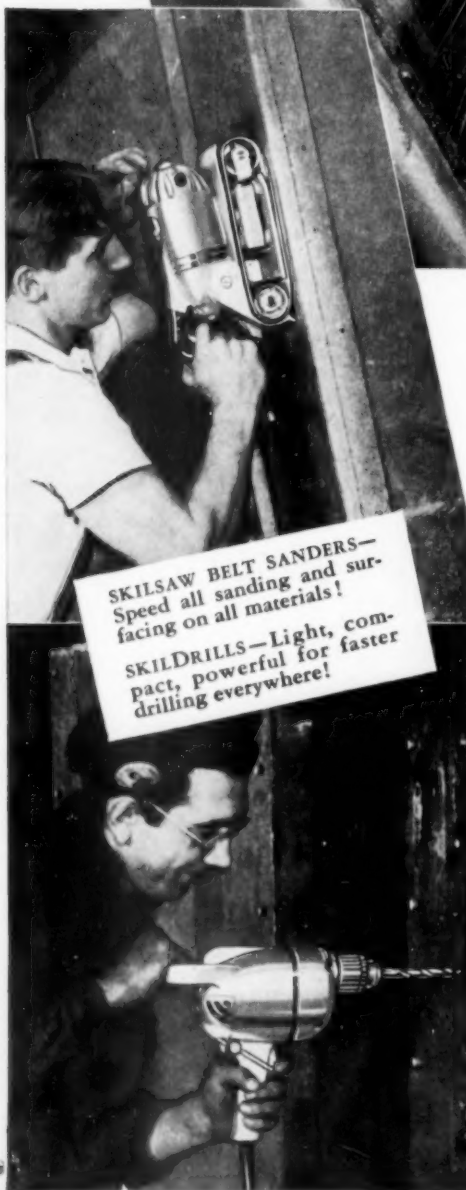
HARD-FACING RODS FOR EVERY PURPOSE

"Stellite" is a registered trade-mark of Haynes Stellite Company.

FEBRUARY, 1944

DOING TOUGH JOBS *Fast* takes the *Speed and Stamina of* **SKILSAW TOOLS!**

EVERY MAN
COUNTS FOR MORE
USING SKILSAW TOOLS!



SKILSAW BELT SANDERS—
Speed all sanding and sur-
facing on all materials!

**SKILDRILLS—Light, com-
pact, powerful for faster
drilling everywhere!**

It's the *punch* and *power* of SKILSAW TOOLS that makes them favorites in War Plants today. It's the *punch* and *power* of SKILSAW TOOLS that will make them favorites with you! SKILSAW TOOLS are rugged, dependable, *faster-working* . . . they'll bust tough bottlenecks, boost production and stand up longer under hardest usage. And SKILSAW TOOLS are light, compact, perfectly balanced . . . they'll handle easier, do more jobs and do them better.

Want to see for yourself how SKILSAW TOOLS can save money, minutes and manpower in your own plant? Ask your distributor for a demonstration of SKILSAW TOOLS today!

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5051 Elston Ave., Chicago 30, Ill.



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Special Tool Maintenance Manual

There's a big Special Section on the Care and Operation of Electric Tools in the new SKILSAW CATALOG! Full of illustrations and valuable suggestions on How to Get the Most from Your Electric Tools in War-time.

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SKILSAW PORTABLE ELECTRIC TOOLS

★ MAKE AMERICA'S HANDS MORE PRODUCTIVE ★



Oilgear generator or pump powering three accelerators that actuate molding presses. Many processes have used this successful Oilgear technique for years and with entire satisfaction.

Putting a Punch in Plastics

Oilgear Made Idle Seconds Do the Work of Dollars

If the new machine or process you are developing has idle moments in its recurrent work cycle, take a tip from Phoenix. The Phoenix Metal Cap Company of Chicago operates a battery of plastic molding presses. These presses require no power at all during the charging periods, so Oilgear engineers saw a way to reduce costs. Instead of the big drive that would normally be required, they installed one small, highly efficient Oilgear Fluid Power generator... and for each press, a single air-accelerator. The Oilgear system works while the presses rest... *building up in the accelerators the tremendous power required for the molding operation.* The saving

in initial drive investment was immense, power consumption was reduced.

This is just another highlight in the story of Oilgear versatility which with Oilgear engineering experience is solving problems up and down the land—machine design puzzles solved by means of the tremendous force in small space... the force without motion... the steplessly variable speeds... the combination of linear and rotary motion... or any of the other functions Oilgear provides. Oilgear may be a "natural" for you. Why don't you find out? Now is the time. ... THE OILGEAR COMPANY, 1308 West Brown Street, Milwaukee 4, Wisconsin.

ARE YOU TRYING TO:

1. Apply large forces through long... or short... strokes at variable speeds?
2. Obtain automatic work cycles, variable speeds in either direction... with or without pre-set time dwell?
3. Apply large forces through continuous or intermittent reciprocating cycles at constant or variable velocities?
4. Obtain extremely accurate control of either position or speed of a reciprocating member?
5. Apply accurately variable pressure either static or in motion?
6. Closely synchronize various motions, operations or functions?
7. Apply light... or heavy... forces at extremely high velocities through either long or short distances of travel?
8. Obtain continuous automatic reversing drives at constant R. P. M. or over a wide range of speed variation?
9. Obtain accurate remote control of speed and direction of rotation, rates of acceleration and/or deceleration?
10. Obtain constant horsepower output through all or part of a speed range?
11. Obtain automatic torque control?
12. Obtain accurately matched speed of various rotating elements?
13. Obtain constant speed output from a variable speed input?
14. Obtain full pre-set automatic control, elimination of problems of shock, vibration, etc.?

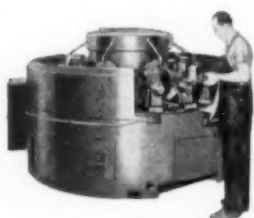
You Need Oilgear!

OILGEAR

Fluid Power

NEW POST-WAR PRODUCTS

call for **NEW** post-war
production plans **NOW!**



SNYDER KNOWS HOW

This 8-spindle rotary turning machine was developed by Snyder to perform a single operation in multiples of eight or successive operations in multiples of four, on hubs, flanges, pistons, etc., made of steel, cast iron, aluminum and other alloys.

Each of the eight spindles is an individual turning and facing machine performing a complete operation upon an individual workpiece while the workpiece rotates and while the central turntable carries the operating assembly around the circle, from, and back to the unloading and reloading position.

Spindle and turntable speed both are changeable through pick-off gears, adapting this machine to a wide variety of applications.

SNYDER CAN GIVE YOU REAL HELP IN PLANNING MACHINES FOR ECONOMICAL PRODUCTION

• If you are planning new post-war products, you also are concerned with questions of how those products will be produced—how *quickly* they can be produced and made available to waiting markets—how *economically* they can be produced so that the largest possible market can be reached. To answer these production questions you must know what machines will best serve your production needs and you must know where and when these machines can be designed, built and delivered to you. For sound planning, you need this information *now*.

Snyder is ready to help you to project your production plans into the post-war period, ready to co-operate with you in designing machines that will automatically perform one or many operations, automatically maintain specified tolerances, automatically deliver the hourly production you will require to establish and hold your

market position and to sustain a healthy payroll.

With such plans completed **NOW**, your machines will be ready to start through the Snyder plant as soon as restrictions are lifted on building machines for non-war production. Delivery to you can then be accomplished in the shortest possible time.

We invite you to write us in full confidence. *Snyder Tool & Engineering Company, 3400 E. Lafayette Ave., Detroit 7, Michigan.*

PLAN Your PRODUCTION
when you
PLAN Your PRODUCT

SNYDER
DESIGNERS AND BUILDERS OF
SPECIAL-PURPOSE MACHINES
FOR HIGH PRODUCTION
AT LOW UNIT COST

20 Years of Successful Co-operation with Leading American Industries

PRICES DOWN

25%

ON

SUPER

**CARBOLOY
TIPPED**

Milling Cutters!

Here's money-saving news for production men! A 25% price reduction on Super Carboloy Tipped Standard Milling Cutters! Think of it! Now you can get the speed, accuracy and dependability of these high quality cutters at prices that mean *extra* economy on all types of production jobs . . . long runs, short runs, even general shop tooling.

How is this price reduction possible? You'll find the answer in our plants—engineering research and development, improved manufacturing techniques, increased production. And we are passing these savings along to you.

If you haven't yet tried Super Carboloy Tipped Milling Cutters, now is the time to do it! You'll learn first-hand why production men the country over who are interested in stepping up production and stepping down costs, specify SUPER. Write TODAY for complete details as to descriptions, sizes and new low prices.

All sizes available from stock for immediate shipment

SUPER TOOL COMPANY

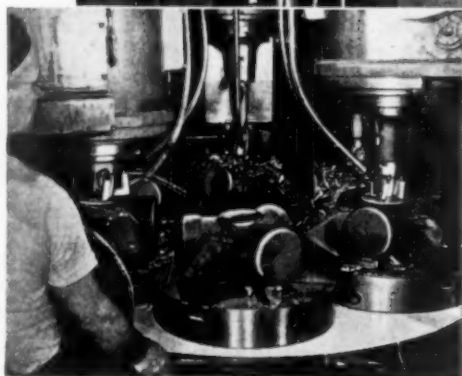
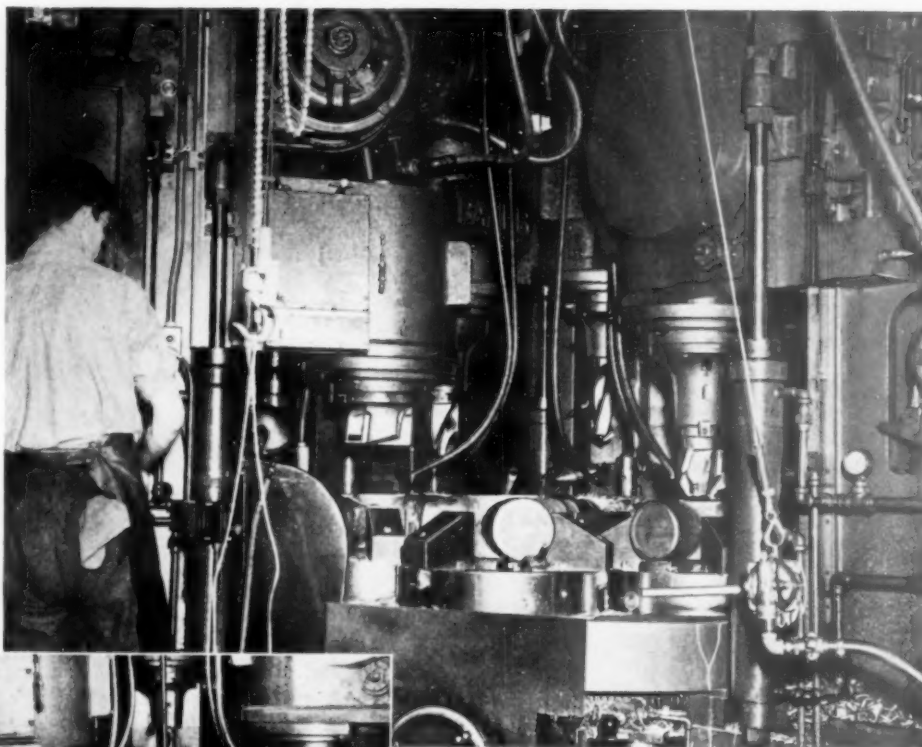
Carbide Tipped Tools

21650 Hoover Road, Detroit 13, Michigan



4105 San Fernando Road, Glendale 4, California

BAKER does tough boring and drilling job on PROPELLER HUBS



LARGE PHOTO shows extra-heavy-duty multi-operation Drilling and Boring Machine consisting of five standard BAKER units. SMALL PHOTO: Close-up of the large hub forgings being machined. Each spindle is driven by an individual motor.



Adaptability and flexibility of the Baker Multiple-Spindle Machine for drilling and boring is typified in the operation illustrated, where a 5-unit Baker Drilling and Boring Machine is performing multi-roughing operations on propeller hubs. The large forgings of rough material demand extreme

rigidity and power as well as close precision on the part of the machine, and this Baker delivers. The index table permits five operations to be carried on simultaneously while the sixth station is used for loading and unloading. Engineering data will be sent promptly upon request.

Baker Brothers, Inc.

Single and Multiple Spindle Machines for DRILLING • BORING • FACING • TAPPING

Toledo 10, Ohio

Announcing the **DALZEN** *Electronic* THREAD GRINDER

NOW—DALZEN BRINGS ELECTRONICS TO THREAD GRINDING, PROVIDING NEW EFFICIENCY, EASE OF OPERATION, SET-UP, AND COMPLETE CONTROL OF WORK QUALITY

The new Dalzen No. 5 Thread Grinder, with General Electric Thy-mo-trol drive, provides the highest possible production of threaded parts, thread gages, straight and spiral fluted taps, and thread milling cutters. Accuracy and finish are exceptional.

Grinding speed—both wheel and work—forward and reverse—is adjusted by the twist of a dial. Variation is infinite and stepless. The Thy-mo-trol drive which makes this possible is backed by

General Electric's own service guarantee.

Full details on this new Dalzen, which makes complete precision thread grinding available to everyone, are given in a striking three-color folder, titled "Dalzen Electronic Thread Grinder." A copy will be sent you, free of charge, on request.

Send for free
descriptive
folder

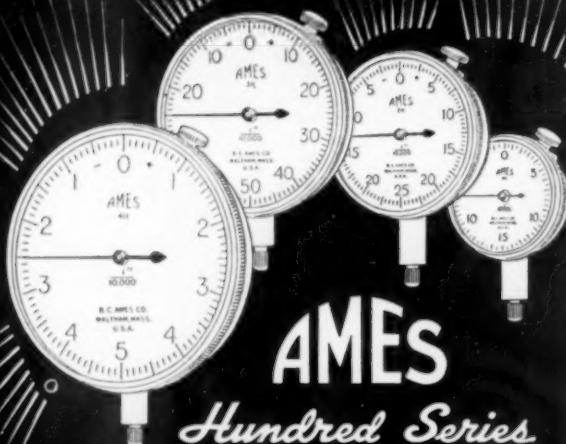
DALZEN

TOOL & MANUFACTURING CO.

12255 EAST EIGHT MILE ROAD • DETROIT (5), MICH.



4 Sizes ~ 14 Dial Faces



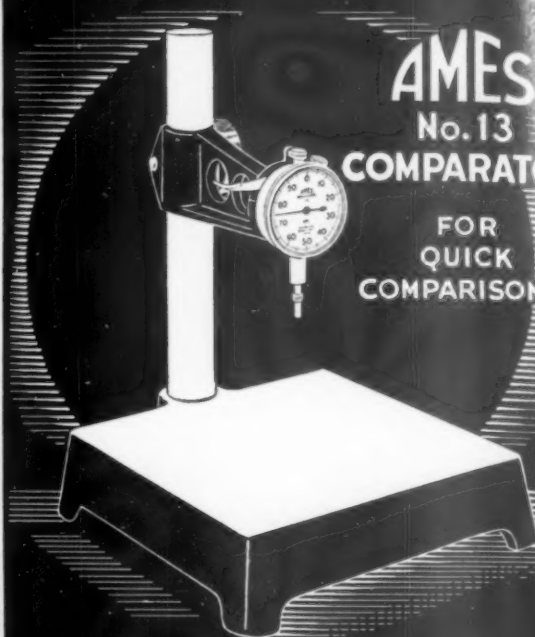
AMES *Hundred Series* DIAL INDICATORS

In four sizes with fourteen different dial graduations, indicating thousandths, half-thousandths or tenths of thousandths inches.

Speedy, accurate, inexpensive and adaptable to various measuring and testing jobs.

Write today for catalog.

FAST • ACCURATE

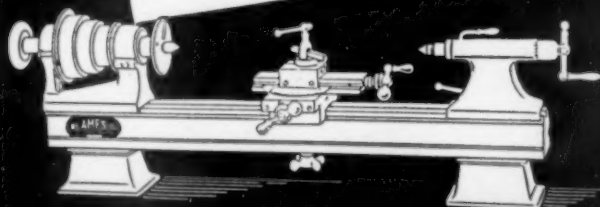


AMES
No. 13
COMPARATOR
FOR
QUICK
COMPARISONS

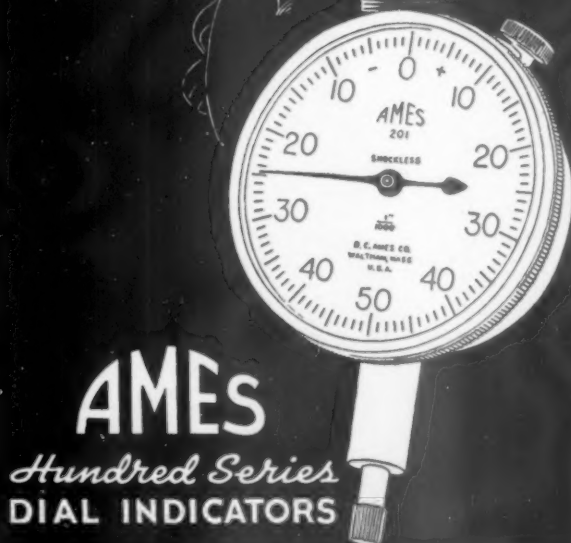
AMES *Precision* BENCH LATHE

Known for 40 years
as a precision lathe
of the highest quality.
Bed 36" long. Ball
bearing headstock
uses 1" capacity col-
lets. Swing 8³/₈" over
bed. Available with
motor drive.

Send For Catalog



Shockless
in
Four Sizes



AMES
Hundred Series
DIAL INDICATORS

B.C. AMES CO. WALTHAM, MASS.

FITCHBURG

GRINDS ACCURATE TO .000025"

CONTINENTAL MACHINES

Incorporated
1301 WASHINGTON AVENUE SOUTH
MINNEAPOLIS

October 8, 1943



ASK FOR
YOUR COPY



The National Machine Tool & Supply Co.
Att: Mr. C. O. Hanson
13 No. 1
Minneapolis, Minnesota

Dear Mr. Hanson:

I believe you will be interested in a job which we performed on the Fitchburg Grinder recently purchased from you.

The job consisted of grinding the O.D. of a piece of hollow tubing 1-1/2" in diameter and approximately 4" long. This part is used as a master squaring gage, and the grinding had to be held to extremely close tolerance of accuracy. Several attempts were made to grind the part by conventional holding methods, but it was found that upon releasing the work from the arbor it would distort beyond the limits to which the part had to be held. We finally devised a method of holding the tubing during the grinding operation, and using the Fitchburg Grinder we were able to grind 100 of these parts to an accuracy of 25 millionths maximum taper over the 4" length, and within 25 millionths of concentricity.

Needless to say, we are very well pleased with our Fitchburg Grinder when we can use it to grind down to millionths in accuracy.

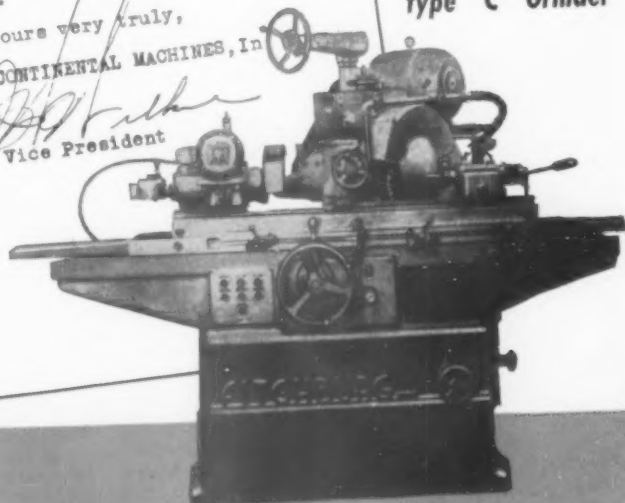
Yours very truly,

CONTINENTAL MACHINES, Inc.

[Signature]
Vice President

JWWilkie.com

Unsolicited letter
received by
Fitchburg regarding
type "C" Grinder



FITCHBURG GRINDING MACHINE CORP.

FITCHBURG, MASSACHUSETTS, U.S.A.

Manufacturers of — Bowgauge Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Bath Full Universal Grinders and Special Purpose Grinders.



Precision in Wartime — Finishing diesel engine pistons for battleships

In 1944

LET'S WORK FOR VICTORY

Only reconversion planning NOW can avert the widespread unemployment otherwise inevitable in the period between cessation of war production and resumption of peacetime production. Not that we have won the war, we haven't, and a long, desperate battle lies ahead. Even so, every bit of postwar planning done now will help in far greater ratio, when V-Day comes, to provide for the stricken people of a ravaged world, in putting our demobilized soldiers and war workers back to work on useful jobs.

If your postwar plans include precision finishing, HEALD ENGINEERING is available, now. Long and varied experience in solving countless problems in precision boring and grinding in consumer and heavy industries, plus our undiminished present efforts in war production, can be immensely helpful. We'll be glad to work with you.

But Plan For Peace

THE HEALD MACHINE CO., Worcester, Mass.

Postwar precision operations will include Heald Bore-Matics like this for facing automotive flywheels.

In 194V the most tremendous shortage of goods this world has ever known must be satisfied — by you and your competitors. Planning now for postwar production will eliminate many bottlenecks later — and if problems involve precision Heald will gladly cooperate in their solution. Although our staff of 250 engineers are engaged on war problems, their experience in finishing peacetime products from automobiles to sewing machines is also available to help in your postwar planning.

In 1944



for More Precision Faster, bring your problem to Heald

MEET YOUR POST-WAR PRODUCTION DEMANDS WITH *Firthite!*

FIRTHITE SINTERED-CARBIDE PUNCHES AND DIES WILL GIVE YOU:

BETTER PRODUCT

Less burring, distortion, and buckling;
more uniform accuracy; better finish—
smoother edges and surfaces.

MORE PRODUCTION

Less idle time for changes.

LONGER LIFE

Edges stay sharp longer; resist chipping
and breaking. Life multiplied many times!

GREATER ECONOMY

Lower cost of maintenance; fewer re-
sharpenings than any steel dies.

Please furnish this information when you re-
quest quotation on Firthite Punches and Dies:

Assembly blue print of present method;
Detail blue print of existing punches and dies;
Description of material punched;
Type of press (full details);
Type of die holder, sub-plate details, etc.



Firth-Sterling

STEEL COMPANY

Offices: McKeesport, Pa. NEW YORK - HARTFORD - PHILADELPHIA
CLEVELAND - DAYTON - DETROIT - CHICAGO - LOS ANGELES

Makers of High-Speed Steels, Tool and Die Steels, and Sintered Carbides

FIRTHITE PUNCHES AND DIES FOR:

★ PERFORATING



★ BLANKING



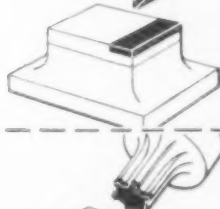
★ SLOTTING



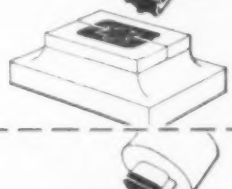
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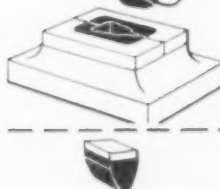
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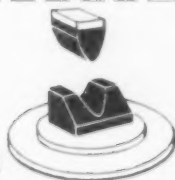
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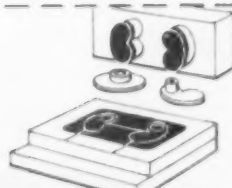
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★ FORMING OR BENDING



★ TRIMMING

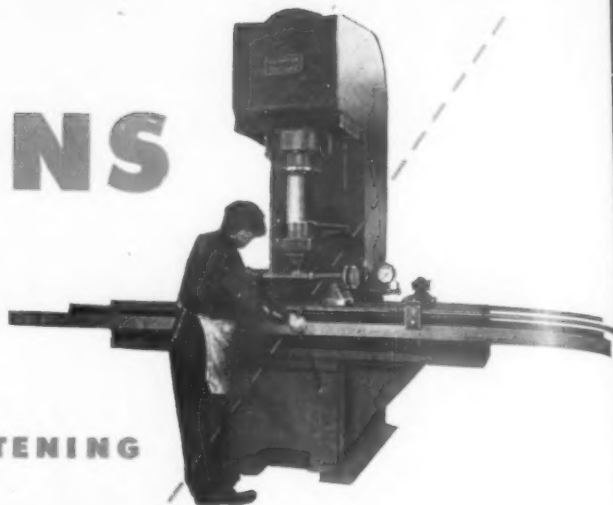


also laminating, burnishing, curling, piercing,
crimping, planishing, broaching, swaging, etc.

100 TONS

AT A FINGER-TIP TOUCH

FOR FAST, ACCURATE STRAIGHTENING



100 ton capacity Hannifin hydraulic press with long table and roller-vee type fixture, being used for straightening forgings at a plant of the Kropp Forge Aviation Company.

Hannifin sensitive pressure control speeds precision straightening operations on a variety of forging work at this Kropp Forge Aviation Company plant. Infinitely variable, proportional ram pressure, from a few pounds up to full capacity of 100 tons is right under the operator's hand. Moving the control lever down increases ram pressure; releasing the lever returns the ram to top position. Operation of this straightening press is so simple, so natural, that the operator's attention and skill can be devoted to the work without thought about control.

Even on small work, like that shown here, sensitive pressure control makes this 100 ton press as easy to handle as a press of much smaller capacity, allowing it to be used efficiently for a great variety of work.

This is but one example of the many Hannifin hydraulic presses being used in modern manufacturing operations by producers of aircraft, machine tools, military vehicles, and armament.

Hannifin hydraulic presses are built in a wide range of standard types, capacities 5 tons to 200 tons, for straightening, forming, press assembly, and similar operations involving the application of pressure. Write for press bulletins or consult Hannifin engineers for recommendations.

HANNIFIN MANUFACTURING COMPANY
621-631 SOUTH KOLMAR AVENUE, CHICAGO 24, ILLINOIS

DETROIT REPRESENTATIVE: R. A. BEAN
Hayward Bldg., 4829 Woodward Avenue, Telephone Columbia 4949

Write for bulletins giving complete specifications of Hannifin products: Hydraulic Presses, Bulletin 60; Pneumatic Cylinders and Air Control Valves, Bulletin 57; Hydraulic Cylinders, Bulletin 35; Pneumatic Arbor Presses, Bulletin 46; Quenching Press, Bulletin 55; "Allen" Pneumatic Riveters, Bulletin 43; "Hy-Power" Hydraulic Riveters, Bulletin 53; Air Pressure Regulating Valves, Bulletin 56; Pneumatic Vises, Bulletin 59.

HANNIFIN Hydraulic Presses

PRODUCTION PERSPECTIVES

*T.M. REG. U.S. PAT. OFF.

WAR PRODUCTION: Official announcement that December totals approximated November figures--and were satisfactory--is interpreted as signaling attainment of the long awaited "victory level" of production....WPB Boss Nelson indicated no over-all increases for 1944 are contemplated.

BREAKDOWN: That year-end production equaled the 11th month's total can be attributed to a 5 per cent gain in aircraft tonnage....Here's the job your industry turned in: Ships, down 2 per cent; Guns, down 2 per cent; Ammunition, off 7 per cent; Motor vehicles, down 1 per cent; Electrical equipment, up 4 per cent....Look for future gains in aircraft and trucks.

AIRCRAFT: A gain of only 13 planes was made in December despite 5 per cent increase in tonnage. Explanation lies in emphasis on bombers. Units delivered numbered 8,802....This year's goal is 100,000 planes, a 50 per cent increase in output....Consolidated Vultee has emerged as Number 1 volume builder....Bombers worth the total cost of much-criticized Willow Run tooling now are produced there every few days. Output exceeds 200 per month.

RECONVERSION: Much public talk, but little government action. Despite auto industry rumors of early retooling and machine tool buying, WPB still has a firm hold on the lid....Psychological effect on war workers of "reconvert now" talk is worrying Washington. Look for efforts to combat it.

FACTS: Materials being released for "essential civilian output" generally permit less than 50 per cent of normal production....Petitioners from individual industries, fearful of sudden cutbacks, have been asked to wait for European victory....Note the innocuous WPB plan to start reconversion in shops employing 10 or less men in 3 cities without severe labor shortages.

MATERIALS: Over-all picture continues to improve....Restrictions on manufacture of alloy tool steels has been substantially relaxed....Leveling of potential steel requirements has brought recommendation of cutbacks in 12 steel plant expansion projects...."Substitute" worries are evaporating.

POST-WAR ENIGMA: Though excess steel does not exist, aluminum may soon glut the market. U.S. production has skyrocketed from 327,000,000 pounds in 1939 to current annual output of 2,100,000,000 pounds. A 14 per cent cut in output is under way. WPB is releasing some for post-war product experiments....Auto men see little use for the metal, but war-born fabricating methods (see page 65) may change their minds. Price is a stumbling block.

MACHINE TOOLS: Shipments in December dropped more than 15 per cent to \$60,680,000. Builders chopped 14 per cent off their backlogs....Industry interest centers on post-war disposal of excess machines (see page 110).

LAST-MINUTE NEWS REVIEW OF MASS MANUFACTURING



How Can He Know She Will?

A technical sergeant, with a damaged plane to repair . . . his workshop, a beach in the South Pacific. Yet he promises a completed job as casually as though he were repairing the doctor's flivver in a garage back on Main Street.

What is the basis of his confidence?

At bottom, it rests on the standardization now practiced in all American precision manufacture. When every part of a complex mechanism is made to standard sizes, interchangeability is complete. Production is speeded. You have a reserve of replacement parts

wherever you need them, when you need them. And you don't wonder whether they will fit . . . they're made to fit.

* * *

There are many fields in which still further standardization of threads is possible. After the sergeant and his mates have won the war we're in now . . . a fuller utilization of the existing accepted standards will help to win the even bigger battle we shall then face — to build a peace-time economy that will provide jobs for all who want to work.

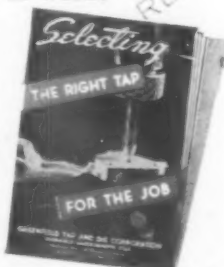
Standard Threads—

SAVE TIME - SAVE MONEY!

Full utilization of existing accepted sizes, pitches and forms can bring lowered costs to all manufactured products because: (1) it speeds production; (2) it reduces inventory. NOW, when plans for new and better products are taking shape — now is the time for a united effort to bring about greater standardization of threaded parts

Send for booklet "Selecting the Right Tap for the Job" — 18 pages of Facts, Tables, Suggestions

GREENFIELD TAP AND DIE CORPORATION



GREENFIELD
MASSACHUSETTS

Forming Aluminum



Goodyear drawing and photos

Goodyear's Roto-Stretcher is a new standard machine and fixture for contouring extrusions, channel sections and bent-up sections to specified radii. It produces smooth contours by a stretch-forming operation.

WITH ALL CREDIT to the aluminum industry for its rapid expansion of metal producing facilities, much acclaim is due the production engineer for his inventions of standard fabricating equipment to meet high production schedules. Designed to meet special conditions, these have since become standard. To a considerable extent, more metal was obtained by multiplying the application of known processes. Far less predictable in the course it would take has been design of machines for plane and ship parts.

With all the talk of rubber dies and hand forming, laymen to this phase of metal working may well have wondered whether the benefits of aluminum, from a product design standpoint, could be economically realized through application of mass production techniques. In other words, would manufacturing costs make aluminum products, other than pots and pans, available to mass

JERRY WILFORD

ASSOCIATE EDITOR

markets. The seeming predominance of drop hammer methods and hand hammering to specifications must have appeared acceptable only in view of the inexorable demands of Army and Navy specifications.

Much of the worry and headache in aluminum forming has resulted in design and application of new standard production equipment, in rapid order.

The Goodyear Aircraft Corporation has been a leader in aluminum fabrication. After a little reflection, this should not seem odd to the production man who has read in his daily paper for many years of the pioneering work done by this concern in the construction of lighter-than-air craft. Though airship gondolas and other parts were not mass-produced, this company's engineers gained broad experience in working with aluminum. They became well acquaint-

ed with its physical characteristics, which for all practical purposes was the number one requirement for application or development of manufacturing equipment.

Goodyear people knew how aluminum differed from other metals, in what ways its various alloys differed from each other. Reaction to heat treat, forming techniques applicable to the many alloys, and an understanding of special properties were part of the knowledge collectively held. Enough new alloys have been developed, and enough new shapes and contours have been specified for war use, so that these men were not at the top of the ladder, and they were open minded. When machine and tool design men were imported from mass production fields, a meeting of minds resulted.

More than many other companies, Goodyear is abandoning drop hammer methods as much as possible. Where their use is required, this or-

Taking advantage of the "set" obtained by adding stretch to the bending of aluminum shapes, the Goodyear Aircraft Corporation has developed a machine for mass production which eliminates springback and hand work. Complete details are prefaced by other data on aluminum forming progress

ganization has not hesitated to make the most of its experience in the rubber business. Rubber pads have been developed to varying degrees of hardness, as well as thickness, increasing the range of combinations.

Recognizing aluminum's highly plastic characteristics, Goodyear has taken advantage of one special property, the "set" which is obtained by combining stretching with bending to shape. Working with material in "SO" condition, sufficient, but no more, stretch is applied to develop shapes free from wrinkles. Where required, as much as 12 per cent elongation may be produced to guard against springback, with no alteration of physicals.

At present, Goodyear engineers are considering the possibilities of working with dead annealed stock, where heat treat can be counted upon to bring formed parts up to specified physical characteristics. Though sheets are received in a wavy, almost limp condition, a one per cent further elongation limit may be anticipated. This advantage may frequently spell the difference between hand working and its elimination. The original condition of the stock, insofar as waviness is concerned, is immaterial, in that stretching removes as well as prevents wrinkles.

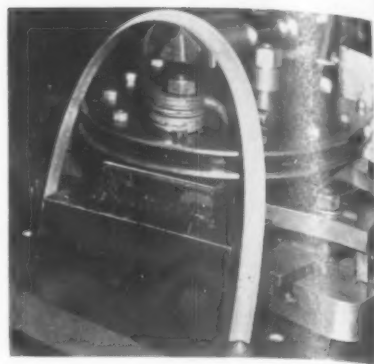
Consideration of the dead annealed stock's use was an outgrowth of a constant effort to work wherever possible with stock conditions favorable to production problems. For example, when "ST" condition is specified for a finished part, Goodyear will, as far as possible, form the part in "SO" condition, and heat treat to specification. Because of delayed

reaction. After heat treat, parts can be re-worked to correct distortion.

Typical of techniques which have advanced production output by simplifying the job and lowering the man-hour requirement is the use of scallops where possible to remove wrinkles, eliminating hand work. Provision for stiffening ribs is frequently incorporated in die design. For example, where extrusion sections were riveted to a compound contour to provide strength, development of stiffening ribs in the forming process saves weight and man-hours.

In eliminating hand work by the application of standard forming equipment which incorporates stretching action, Goodyear has applied a type of machine peculiar to aluminum parts fabrication. The machine consists of two jaws for gripping opposite sides of a sheet and a ram between, moving upward to exert forming forces. To the ram, a die, or forming block, is secured. Forming action, basically, consists of a two dimensional stretch to required contour. The 100-ton jaws travel in and out as desired, while the material, which is under tension, generally stretches to final shape after the first stretch is obtained by raising the die. Working almost to the elongation yield point, internal stresses are reduced and springback is avoided. Because the ends of the long horizontal clamping bars, or jaws, can be moved in and out independently of each other, force can be exerted in three directions, including the vertical action of the ram.

Jaws are operated by a hydraulic mechanism. Dials indicate the relative position of the ram and each of



A finished stretch-formed product, the jaw ends. Skill is required to develop a routine of action for the jaws and ram. Once developed, the routine can be diagrammed by dial readings, and anyone familiar with the machine can take over.

The most notable recent Goodyear aluminum forming achievement is the design and application of a standard machine and fixture for contouring extrusions, channel sections, and bent-up sections to specified radii. The machine, known as the Roto-Stretcher, produces smooth contours by a combined stretching and winding operation, utilizing a forming die or block.

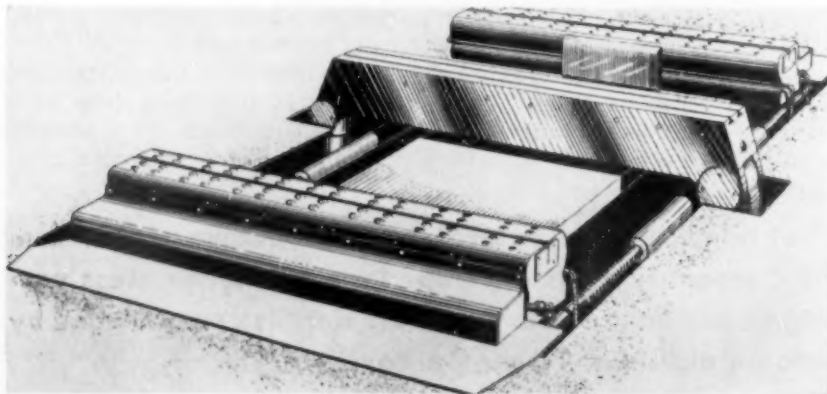
360° CONTOURS POSSIBLE

An advantage of foremost importance is that of being able to form substantially 360° contours of small radii.

The fixture consists of a base upon which are mounted a revolving table and a hydraulic cylinder. The cylinder is attached to a continuous chain between a sprocket secured to the turntable and an idler sprocket. As the table rotates, the cylinder is moved toward or away from the table, at exactly the same lineal speed as that of the periphery of the sprocket.

Stock is held between two pneumatic jaws, one of which is fastened to the hydraulic cylinder piston rod. The other is clamped to the turntable, being positioned in accordance with the size and shape of the die around which the stock will be formed. Two clamping arrangements are provided in the machine, as used at the Goodyear company's Akron plant. One type jaw accepting only the ends of stock, permits a maximum stock length of 72". The second type jaw, which will clamp anywhere along the length of the stock, will accept lengths which are almost unlimited. Pulling capacity is 15 tons.

Aluminum stretch-forming press is essentially a press bed with clamps and an up-thrusting form that takes the place of the punch. With die or form secured to center ram, sheet is laid over the form and held down at opposite ends by compressed air clamps. The form rises, forcing itself into the metal, stretching and shaping the material to contour.



Springback of parts formed on the Roto-Stretcher is negligible, which is an important factor in producing parts which are 100 per cent uniform. Costly hand work is eliminated because contours are formed without wrinkles. This is made possible by the general construction and "wrapping" characteristics of the machine and by the hydraulic control which maintains a controlled tensile force during the forming operation.

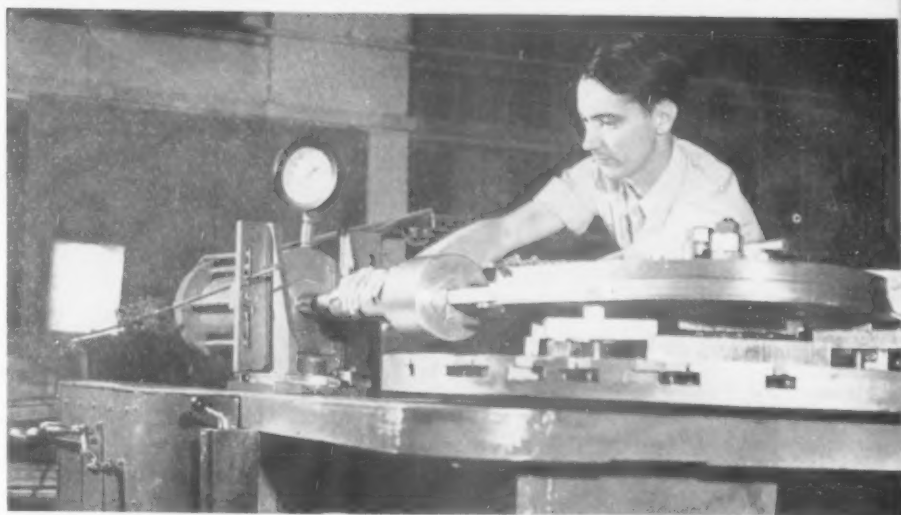
Not only can extremely small radii be produced, but contours up to 360° can be stretch-formed, operation previously impossible.

An average of 45 seconds is required for one complete cycle of the revolving table. Translated into time required for stretch-forming, this is not only high production, but it also represents tremendously increased efficiency over former methods. Only one person is required to operate the machine as compared to eight to ten hand workers previously needed.

PRODUCING SMALL RADII

Forming blocks are usually secured to the revolving table by means of standardized clamping blocks, which can be attached in various positions on the revolving table. Two studs hold form block and clamping blocks together. In forming slight contours, no adjustment is required, once the set-up is made. In producing small radii, it is necessary to distribute the stretch-forming action evenly around the contour. To do this, the forming block unit may be pivoted on the clamping block by removal of a holding pin. The form block then swings or pivots so that the stretching action is applied directly at tangents to the radii on the far side of the form block, with relation to the hydraulic cylinder. Control of the pivot is maintained by the action of a pin in a curved slot. Even distribution of the stretching action prevents springback.

A "setting" operation is frequently required on all but slight contours to assure complete elimination of springback. Whereas the first operation is performed with aluminum in "O" condition, and with the holding pin in place, the second operation is performed after heat-treat, but while the material is in "W" condition. After the work is set-up and pressure applied, the holding pin is removed, permitting the form block to pivot toward the hydraulic cylinder, and concentrating stress tension at the far side of



End of stretch-forming operation.

the block. A permanent "set" is thus produced on the far side of the contour. When the form block reaches the limit of its pivot stretching is continued by the cylinder, causing a permanent set in the near side of the contour. The part is then removed, finished except for trimming.

Where only one operation is required, as in forming to slight radii, the stock is stretch-formed in "W" condition.

Because the distance from the form block periphery to the center of the turntable varies, the peripheral speed of the block and the speed of the hydraulic cylinder's advance will vary. The movement of the piston in the cylinder compensates for this difference, so that predetermined tension can be maintained. However, if desirable, tension on the work can be in-

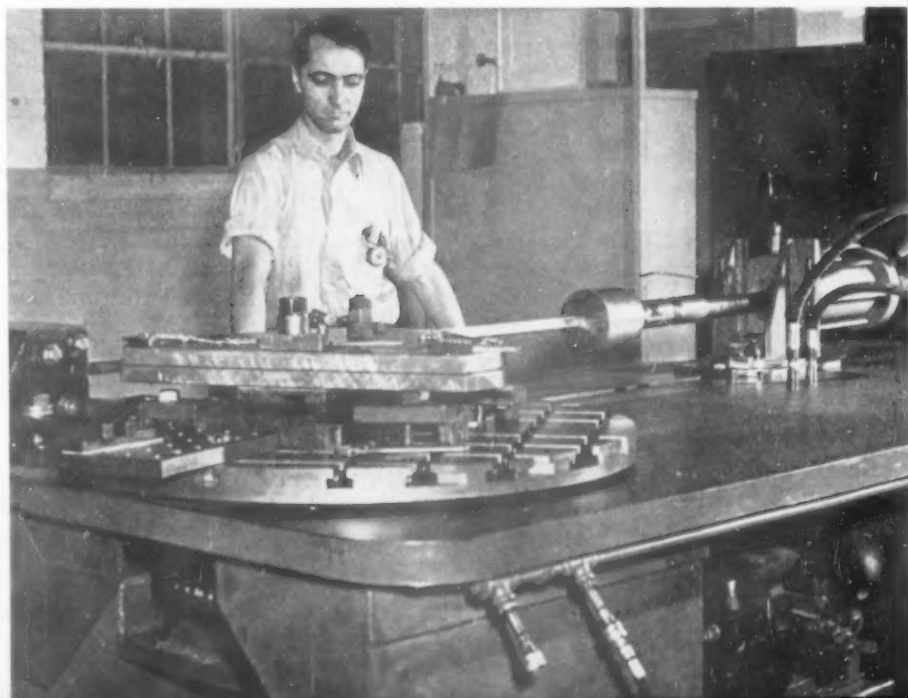
creased or reduced during forming.

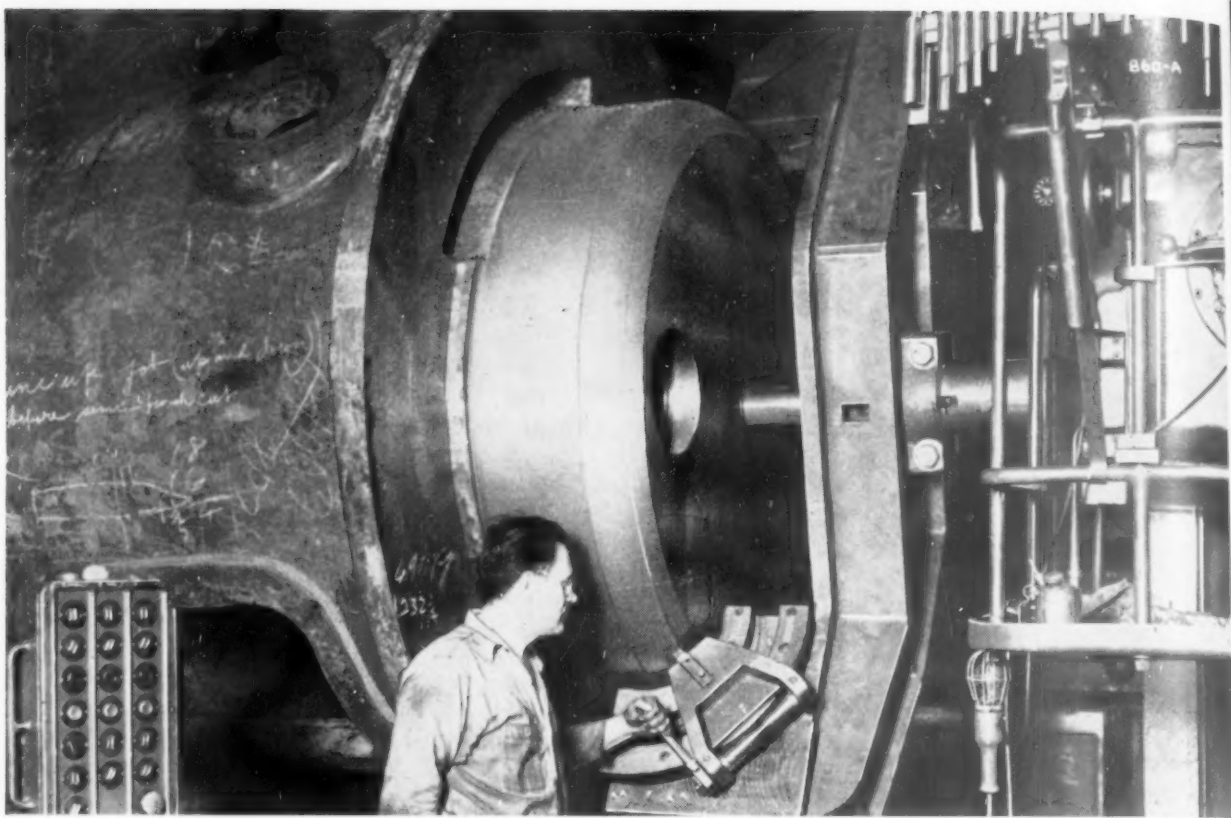
Forming blocks are produced from Masonite, wood and other typical materials. An important consideration, however, in forming small radii, is to use material which can withstand concentrated stresses.

Design and construction of Roto-Stretcher is credited to James S. Nielson, Manager of the Experimental Tool and Machine Design Department and C. B. Mitchella, Machine Design Engineer, Goodyear Aircraft Corporation.

Construction and maintenance costs of the machine are relatively low, because of the simplicity of design, and the minimum of precision machined parts required. At present, the T. W. & C. B. Sheridan Company of New York has been licensed to build the Roto-Stretcher. THE END

Roto-stretcher at beginning of operation.





Giddings & Lewis photo

This floor type machine performs a radius turning operation on a large boss on a press. A special yoke provided with a worm-fed segment is applied to the spindle for turning the radius. The flange back of the boss has been face-milled previously. Boring operations also are performed in the same setting.

INCREASE YOUR MACHINE RANGE

THE MACHINE set-ups described in this article are presented in response to various requests for "know-how" on doing unusual jobs—or rather, usual jobs on machines that, ordinarily, do not come up to the required range. While the methods shown are not recommended for production runs, one may expect fairly satisfactory performance if care is taken in setting the work up. It all boils down to mechanical gumption or ingenuity.

Take, for example, the wheel shown being turned and faced in a milling machine, Figure 1. The workpiece is swung between the column and saddle,

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much after the manner of turning in a gap lathe. The tool is clamped in the vise. It is not essential, on large diameters, that the tool be on center unless facing close to a hub or an arbor. For turning, or facing a flange, as on flywheels, it is sufficient if the cutting edge of the tool is radial.

There are two possible "bugs" in the method, either of which is easily remedied. One is a tendency to chatter. That can be reduced, if not entirely eliminated, by applying a brake, of

wood or leather, against the periphery or one face. The other is that the leverage imposed by the tool against a large diameter tends to stall the machine. However, back gears may have to be used, on account of surface speed, and this considerably increases torque. If the machine still tends to stall, one must reduce cut and feed.

As aforesaid, the method is not ordinarily recommended for production runs although, in the writer's experience, various long run jobs have been profitably "turned" on the miller. One such job was a spider of con-

Besides highlighting universal features of the horizontal boring mill, this article considers possibilities of turning on the milling machine and of mounting a small lathe cross-wise to an open-belt machine. If you are required to turn a large wheel, or cut a gear, and your equipment is under the required range, here are ideas which may help you

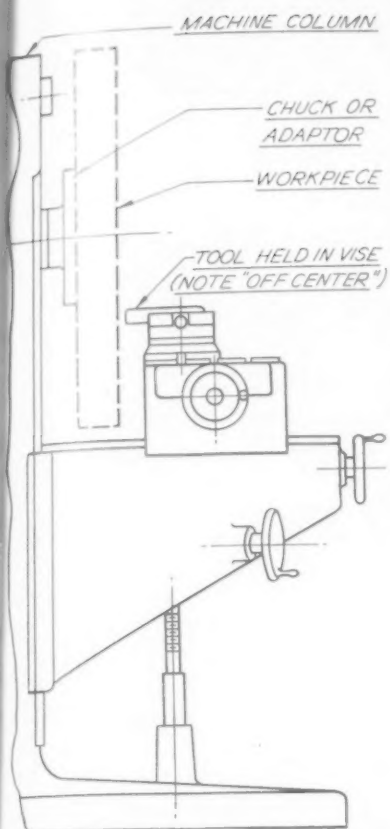


FIGURE 1. Turning a wheel on a milling machine. Workpiece is swung between column and saddle. The tool is clamped in a vise, secured to the table.

siderable diameter, that had to be bored and faced to close tolerances. The output was so surprising, on experimental runs, that permanent holding fixtures were made and the entire run made on the miller.

Or, similar jobs may be done by reversing the headstock of an open belt (cone pulley) lathe, and mounting a smaller lathe crosswise to the spindle. The larger lathe rotates the work, the smaller, with the carriage on longitudinal feed, faces it. For turning short diameters, as flywheels, the cross feed may be used. This method is known to most pattern makers and is occasionally used in jobbing and repair shops, and is so obvious that no other illustration than verbal description is necessary.

Why not send the work out if the proper machine is not available?

Well, there are various and valid answers to that. The proper machine may not be in the immediate vicinity, especially in small urban centers, or, if it is, it may be tied up. And, shipment to remote facilities may be so costly as to entirely cancel out possible profits. On such occasions one resorts to ingenuity, a characteristic trait of the Yanks.

A better way than either of the two described above, for doing similar turning jobs, is to set up in a horizontal boring mill, as shown in Figure 2. Here, the problems are largely comparable to those encountered when using the miller, with, however, the advantage of more room. The carriage having greater travel than the cross feed of a miller, one can turn pieces of considerable length as well as diameter.

In this connection, the writer would say that the horizontal boring mill comes about the nearest to being the universal machine. On it, and to greater range than on any other machine tool, one may drill, bore, mill, turn and otherwise machine an infinite variety of work. One may machine fixtures complete, even to accurate jig boring, and, as will be shown, one can cut large spur gears and even large worm wheels.

Figure 3 shows a large gear being cut on a horizontal mill. This illustration is supplemented by Figure 4. Having turned the blank as shown in Figures 1 and 2 (or, by any available method), the next set-up will be for cutting the teeth. Though this may be done on the miller, more or less as shown and with the table feeding up, the job can be carried through satisfactorily on the boring mill.

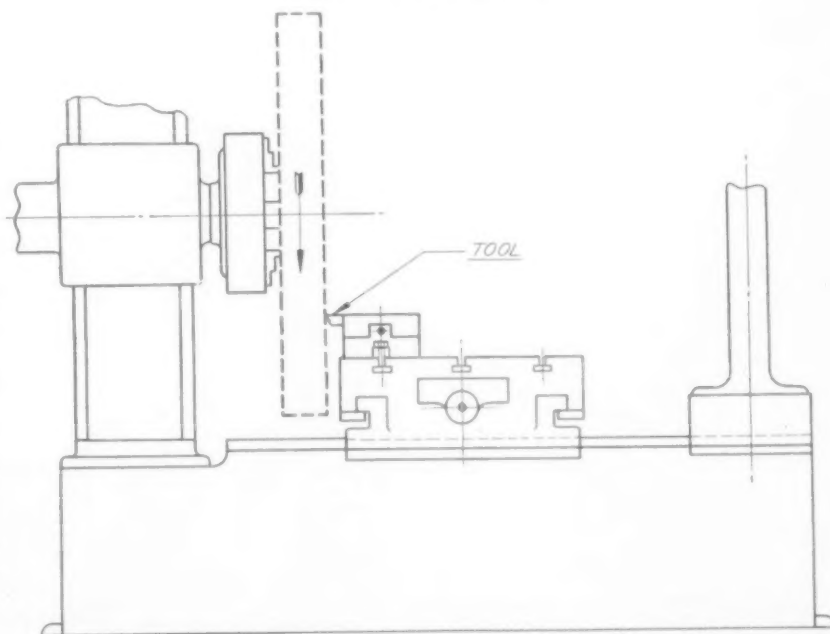
Assume a fairly large blank is to be cut—such as a 6 pitch, 200 tooth gear, pitch diameter 33.33" and O.D. 33.66". Now, this could be mounted

directly on a dividing head, spindle vertical, ready for machining. In that case, indexing would be simple— $200:40=4$ holes in the 20 circle. But, there would be considerable backlash, because of the disproportionate diameters of gear to be cut as related to the index worm wheel. This would tend to develop inaccuracy, further aggravated by chatter and vibration because of the height above table and the overhand.

The backlash can be controlled with a drag or brake, set just tight enough to permit free index without overrun. And chatter can be entirely eliminated by a shoe directly under the cut, and another adjacent to it, but clear of the arbor and cutter. The second shoe becomes the anvil for a clamp, which can be loosened and tightened with each index and cut. With reasonable care, one can turn out a very satisfactory job.

We may, however, find it desirable to compound the job, this having certain advantages over direct index on out-of-range work. Still considering the 6 P. 200 T. gear described, mount the compound gear on a vertical stud having a suitable mounting flange. A driver pinion is mounted directly on the dividing head, the teeth closely meshed. The gear to be cut is now mounted on the stud and clamped to the compound gears by means of screws. Differences in bores may be compensated by a bushing (preferred) or the stud may be stepped. As in the

FIGURE 2. Turning a wheel in a boring mill affords more room, both as to carriage travel and the size of work.



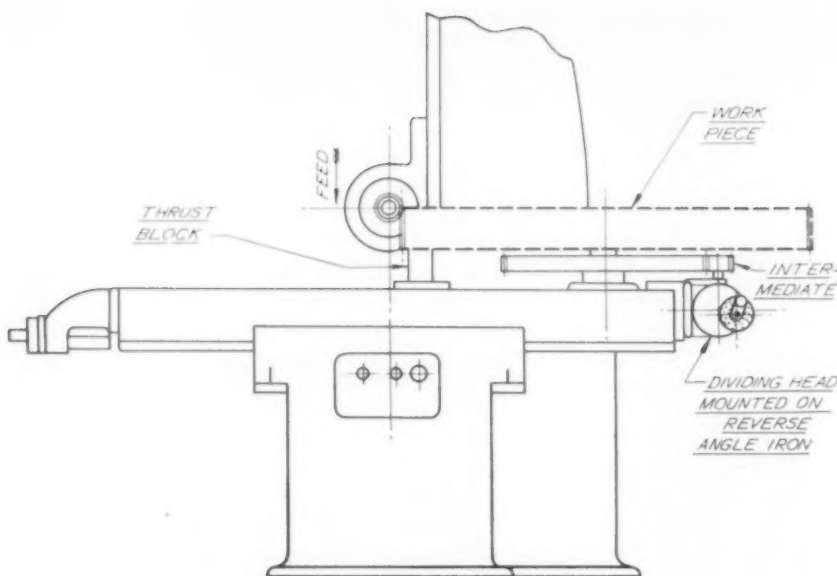


FIGURE 3. Cutting a large gear on a horizontal mill. See supplemental view in Figure 4.

previous set-up, a thrust shoe and periphery clamp are provided. The illustration shows details of set-up.

Assume, now, the use of a compound gear of 100 teeth, and a 10 tooth pinion, and the conventional 40:1 dividing head. Then, 200 divisions (teeth to be cut in the blank) of the 100 tooth gear resolves to 10 revolutions of the pinion for one complete revolution of the gear to be cut. This, times 40 (dividing head ratio), makes a total of 400 turns of the crank, or worm, for one complete revolution of the gear—or 2 turns of the crank for each tooth to be cut.

$$\begin{array}{rcl} 400 \text{ turns} & -2 & \\ \text{Or, } \frac{400}{200 \text{ teeth}} & & \text{or 2 turns} \\ & -1 & \end{array}$$

If, instead a gear and pinion of 96 and 12 teeth, respectively, is used, then:

$$\begin{array}{rcl} 96 \text{ teeth-} & & \\ \frac{96}{12 \text{ teeth-}} & = 8 \text{ turns of drive pinion} & \end{array}$$

X 40 = 320 turns of worm to one complete turn of gear.

$$\begin{array}{rcl} 320 \text{ turns} & 12 & \\ \text{Or, } \frac{320}{200 \text{ teeth}} & = 1 \frac{12}{20} & \text{or one turn} \end{array}$$

and 12 holes in the 20 circle, or, one turn and 24 holes in the 40 circle. Other ratios may be figured accordingly.

The obvious advantage of this method is that backlash is considerably reduced. One must, however,

assume that the compound gears are accurate. They usually are, otherwise all set-ups involving gears would have to be discarded.

There is another reason for showing the compound. Instead of a spur gear, the object may be to generate a worm wheel. Then the procedure is as follows:

First, gash the blank by either of the methods described—i. e., by direct or compound indexing—with the exception that the stud should be tilted

to the required tooth angle.

Next set the stud vertical, as for a spur gear, and, either hob the wheel free, the hob acting as its own driver, or, drive through the compound gear. If the teeth are gashed deep enough, and with a No. 1 cutter (corresponding to a rack) a very satisfactory job can be done by free cutting.

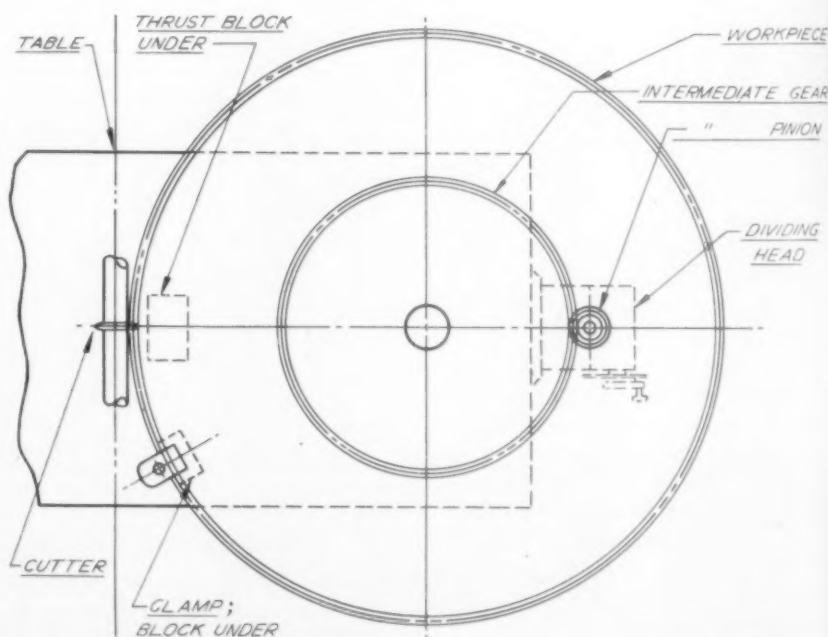
To drive through the compound, one would mount a worm at an angle and drive the gears from the spindle—i. e., a driver mounted on the cutter arbor, the driven gear on the worm shaft, with idlers or intermediates as required.

Outside the possible inconvenience of setting up a machine not originally designed for gear cutting, one difficulty presents itself. Since the feed is downward, and the spindle head, travels, rather than the table, an overhanging support for the arbor must be provided. That however, is comparatively simple improvisation and once made can be used on a wide variety of work.

Some production engineers may never be called upon to set up a job or jobs in the manners shown, but these out-of-range jobs do crop up, and then they must be licked. Everybody does not know how to handle them, as attested by inquiries for information of this sort. Here, the answers are simply passed on for the benefit of those who "read as they run."

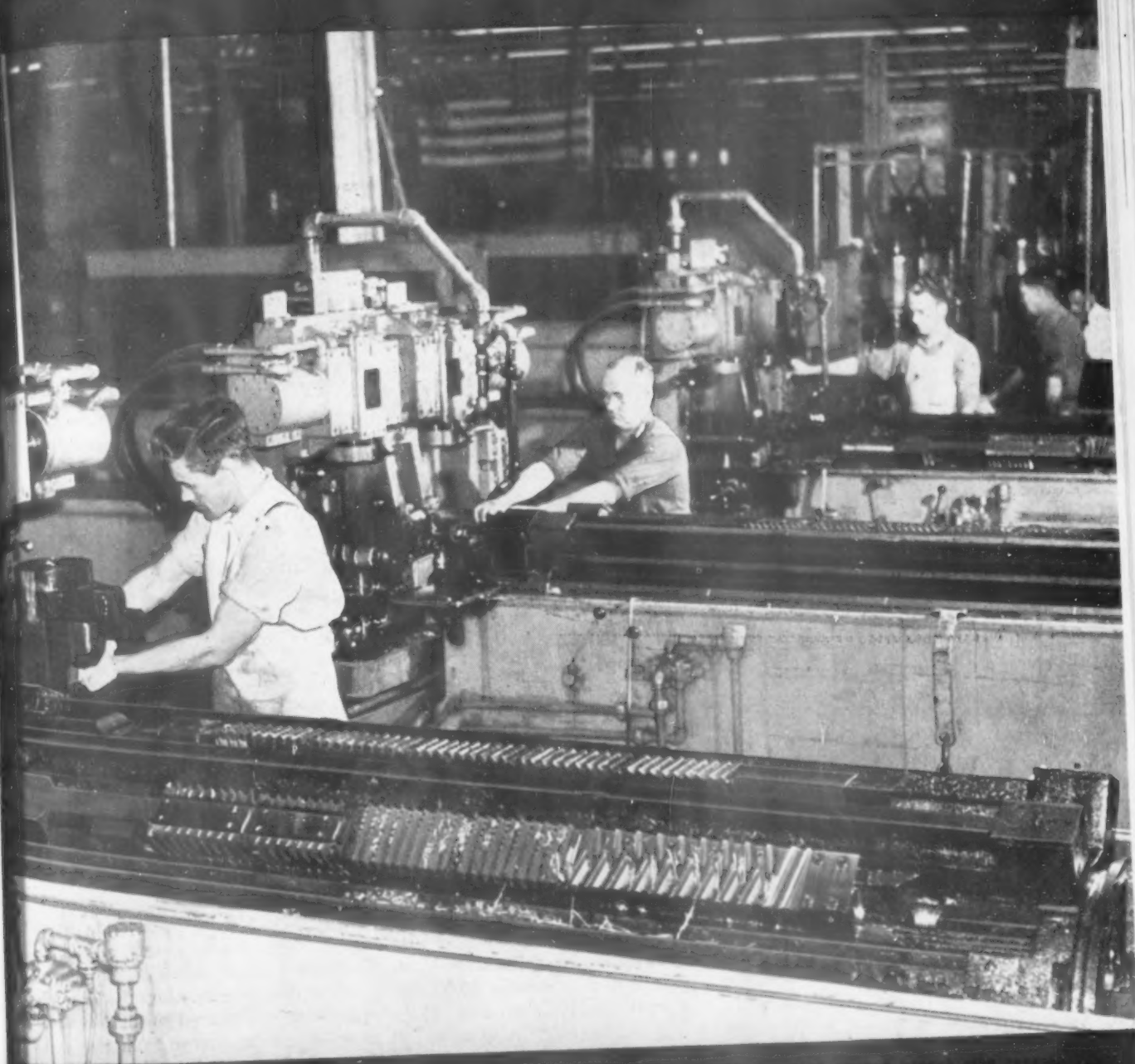
THE END

FIGURE 4. Supplemental view of cutting large gear on a horizontal mill, shown in Figure 3.



PRODUCTION

MACHINE AND TOOL ENGINEERING



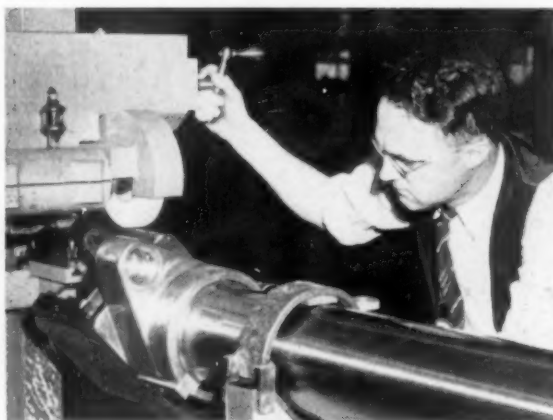
"AUTOMOTIVE TECHNIQUES" CUT PRODUCTION COSTS

Mass manufacturing methods pioneered by Oldsmobile have made the General Motors Division a pioneer in ordnance production. Machine and tool engineering techniques which have converted men, metals and machines are featured in this section.

THE TOOL ENGINEER

Streamlined Production

AUTOMOTIVE TECHNIQUES CUT PRODUCTION COSTS



Production economy in machining, materials handling, and materials use has resulted in worthwhile savings. A cross-section of ideas which may be applied broadly is presented in this regular how-to-do-it feature

**SPECIAL FEATURE
BY THE EDITORS**

Oldsmobile photos

Left—Grinding leveling plugs. Two special machines grind leveling plugs on the breech rings of the 75 mm. tank guns, after tube and breech ring have been assembled, handling eight per hour.

FIFTEEN MONTHS before war was declared, the Oldsmobile Division of General Motors Corporation submitted a proposal for converting a newly-acquired forge plant to the production of 75 mm. and 105 mm. high explosive shells. A contract was awarded in November, 1940. In April, 1941, it expanded its production for the National Defense Program by undertaking the manufacture of the 20 mm. automatic aircraft cannon.

These dates are significant production-wise, because they point to long experience in ordnance parts fabrication. In the more than three years now past, this company has invested the time of its production engineers to good advantage, pioneering many high production techniques. Although its people say it could not help pioneering, being among the first in war production, the record indicates achievements beyond those which may be attributed to years of service. It also indicates the tooling ingenuity for which the automobile industry is famous.

Much of this Streamlined Production feature is devoted to those achievements in developing new practices in milling, broaching, boring, grinding, and turning ordnance parts. Parts of it are concerned with materials handling, metal conservation, and forging progress. Some paragraphs describe the application of ordinary common sense. All

of the feature is devoted to highlighting the Oldsmobile Division's production economy—its saving of men, materials, and machines.

Much of this "know-how" has broad applicability. For the record, however, certain achievements are worth reviewing here, although their technical advantages to ordnance manufacture are well known by now. They indicate the manner in which this company, accustomed to high production, has approached its war-time job.

One of the outstanding time and labor saving applications was the replacement of the single tool, indexing type rifling machine with the multiple tooth pull broaching machine. In manufacturing 20 mm. aircraft cannon, the broaching method proved to be 10 times faster.

Oldsmobile was the first to revise stock specifications for the copper rotating band on shells in ordering a reduced outer diameter. Copper, machine time, and tools were saved by working with a smaller band. Per million shells, 50,000 pounds of copper were saved on the 75 mm. shell, and 125,565 pounds were conserved on the 105 mm.

Also worthy of mention was the change from gas-fired furnaces to induction heating in preparing billets for forging. With a lower labor cost, production was raised from 70 to 103 units per hour.

MACHINING

Milling

OLDSMOBILE was among the first companies to manufacture the 20 mm. M-2 aircraft cannon in the United States. Because this gun was previously built in France, no ready source of information existed concerning manufacturing processes or for confirmation of engineering decisions. Largely, Oldsmobile had to rely on the judgment of its production engineers in applying certain high production methods. Its confidence in its men was justified by such results as were derived from devising a milling machine which replaces several grinders.

From machine tool trade sources, information was received that stated the French had finish-machined the inside channel of the receiver body by grinding. Types of grinders varied from surface grinders using cup-shaped wheels to others employing pencil shapes. To meet the original schedule of 75 guns a day, it was estimated that between 30 and 40 of these machines would be required.

To simplify the finishing operation, engineers from Oldsmobile's production department and designers from a prominent milling machine company attacked the problem together. The result was a special type of side-cutting milling machine. It was developed to supply special spindle speeds and coolant application required to produce a finely finished surface.

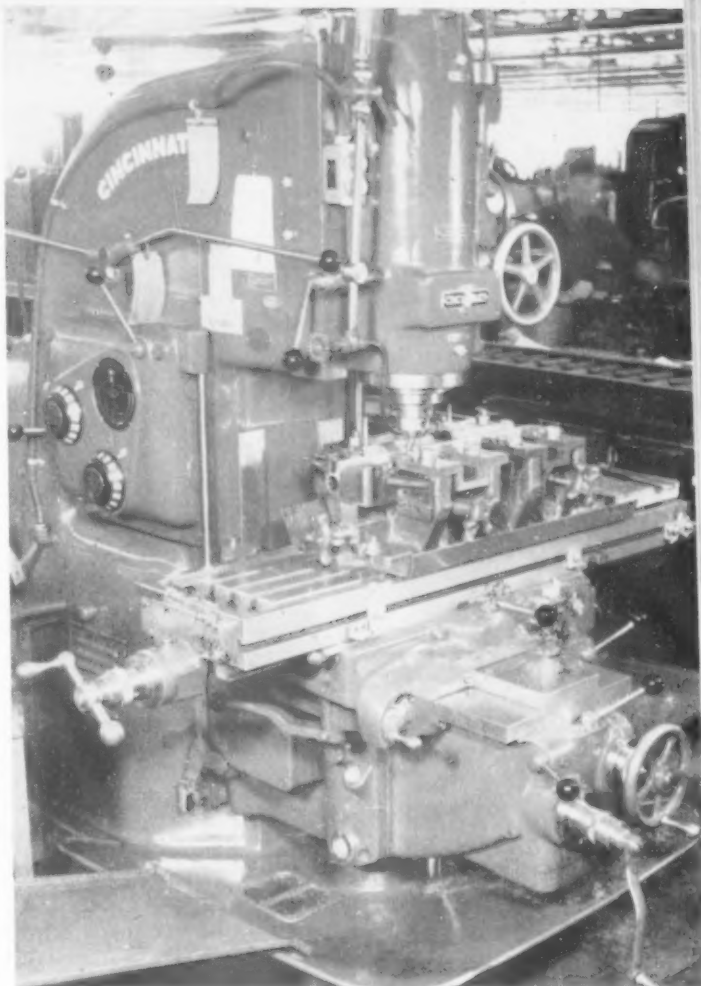
A milling operation had been devised by a sub-contractor utilizing a 10" side milling cutter to finish the 2-7/8" channel wall. Obvious handicaps to this method were the relation between feed and speed for a cutter so large, and the inability of the cutter to finish the blind end of the channel. Coarse feed marks at the top of the wall converged at the bottom. In finishing the blind end, a cutter small enough to do the job tended to spring back from the work. Added to these difficulties was the problem of finishing the job by blending the variously cut surfaces.

The machine now used in the Oldsmobile plant employs a spiral end mill, 1-1/4" diameter. This tool takes a light finishing cut from the material, which is WD-4640—a high carbon steel, heat-treated to 273-300 Brinell. A steep spiral design provides a slight burnish on the surface. With a cutter speed of 179 rpm., a 2-1/8" feed—about .003" per tooth—is used.

With any type milling cutter, it would be impossible to work right up to the end of the blind wall. With Ordnance Department permission, Oldsmobile production engineers provided for a sufficient recess at the end of the wall, allowing clearance for the tool to complete the job.

As developed by Oldsmobile, approximately six milling machines are used, completely eliminating any need for grinders. In addition to reducing machine and plant space requirements, and speeding parts delivery, between 3-1/2 and 4-1/2 man-hours are saved per part.

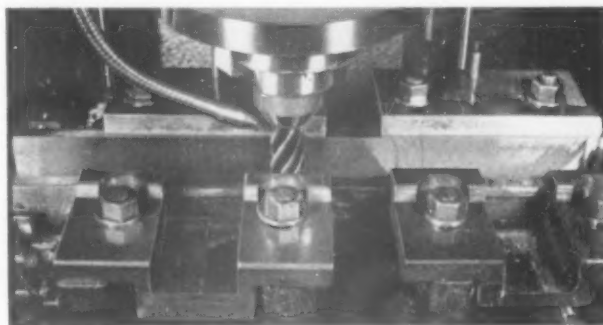
The use of a cam follower on a milling machine, permitted machining surfaces of varying form and elevation



Side-cutting and milling machine developed for finish machining inside channel of the 20 mm. automatic aircraft cannon receiver body, eliminating a tedious grinding job which would have required between 30 and 40 machines.

in one operation. Previously, several operations, requiring three milling machines, were used on this type of job on the 20 mm. receiver body. Greater speed and precision resulted from the new method.

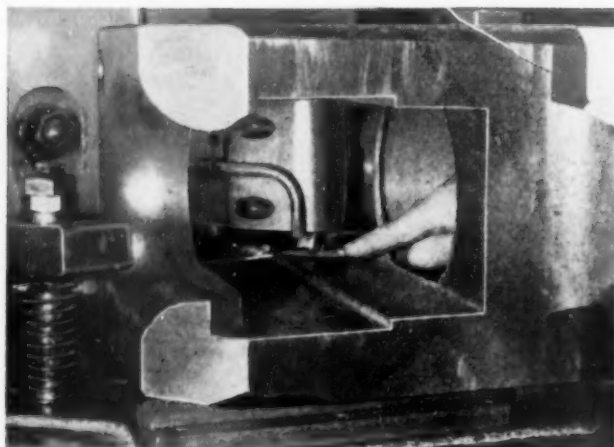
Automatic operation of equipment eased burden on the operator. Not only was there a saving in man-hours,



Close-up of the 1-1/4" spiral end mill which takes light finishing cut from the inside channel of the receiver body. For this material—high carbon steel, heat-treated to 273-300 Brinell, a cutter speed of 179 rpm. and a 2-1/8" feed have proven satisfactory. Slight burnish is provided.

Streamlined Production

Streamlined Production

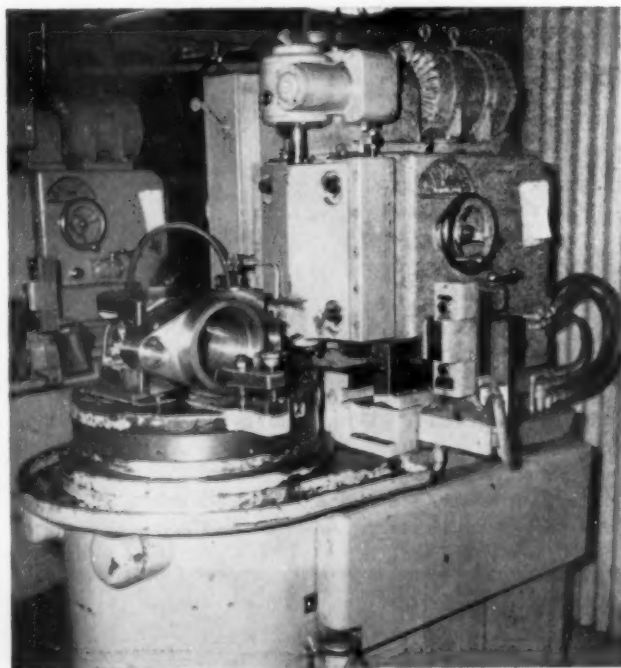


Close-up of kidney pocket in 75 mm. tank cannon breech ring, as machined with special equipment by Oldsmobile.

but the tracer type machine was completely automatic.

In milling kidney pockets inside the breech ring to accommodate the extractor mechanism on the 75 mm. tank cannon, intricacies of form and specified precision seemed to necessitate the use of a profiling machine. However, such equipment required master control development. Inasmuch as this particular operation was performed inside a pocket of the casting, where space was limited, a frail structure would be necessitated for the extension heads used in profiling. Further, every new piece to be machined would require resetting the machine, in that

Vertical milling machine with oscillating table motion which was developed for Oldsmobile for machining kidney pockets in 75 mm. breech ring. It replaces profiling.



locating points could not be used. The operation promised to be slow and to require a skilled operator.

Working with engineers of machine tool suppliers, the plant's production engineers developed an automatic, radial type of oscillating motion as an auxiliary feature of table movement on a vertical milling machine. The vertical milling head travels in a horizontal position toward fixed stops to the point of cut, then drops to make the cut. With the cutter in position, the machine table oscillates radially. After the cut, the tool backs off and the work is removed. The entire operation is automatic.

Table oscillation is motivated by two hydraulic cylinders which drive racks on each side of a spur gear located beneath the table. The degree of arc or table movement is controlled by means of adjustable stops which activate solenoid switches.

With each oscillation, the head feeds downward on a vertical slide. A complete operation on the breech ring kidney pockets requires a battery of four machines, operated by one man. Machines are divided, two to each pocket, one roughing and one finishing. End mills consist of a straight roughing tool, and a finishing tool provided with a slight flange at the top which develops a radius on the top of the pocket.

Utilizing a machine that cost approximately one-third as much as the conventional equipment for this job, Oldsmobile performs the job four times faster.

In terms of equipment used, eight vertical milling machines with cam-controlled table movement, replaced 32 profiling machines. Approximately 1-1/2 man-hours were saved on each job. In view of the frail extension heads which would have been required in conventional profiling, it is safe to assume that a more precise machining job is a further advantage of the new method.

Broaching

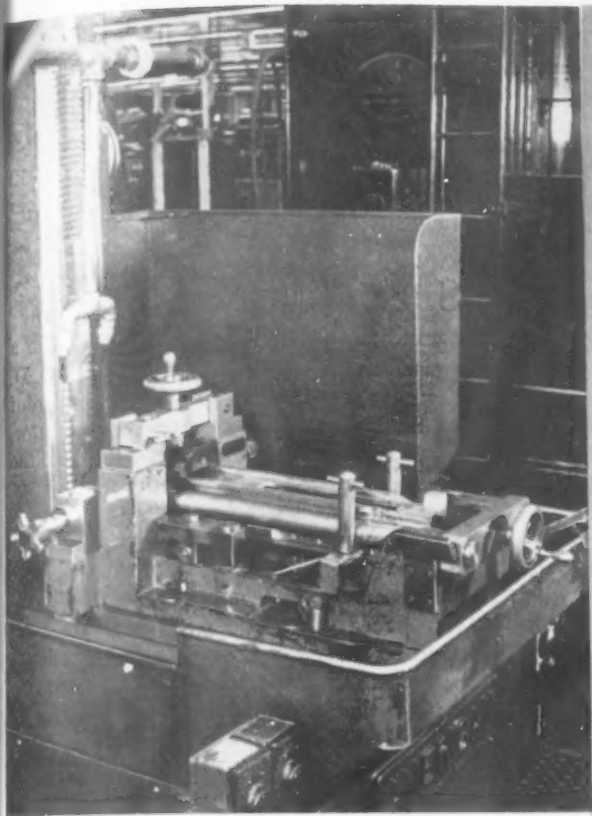
FINISHING the magazine slideway surface on the 20 mm. aircraft cannon receiver body, plus finishing the T-slots that guide the magazine slide, presented a problem of accurately developing parallel planes between T-slot and slideway surface. The European method of doing this was to finish mill the outer surface; then, proceeding from there, the job was completed on a T-slot cutter. This sequence made it difficult to set up the work so that the bottom surface of the T-slot would blend in a plane with the contact surface supporting the underside of the magazine slide. Not only was production speed slowed, but there could be no great assurance of quality.

Using a vertical broaching machine with special form cutting tools, Oldsmobile engineers finish-machined the plane surface of the slide way, following in the same stroke with a section of broaches which cut both sides of the T-slots simultaneously.

Broaches work to a tolerance of .003" in finishing the T-slot.

One broaching machine replaced eight milling machines.

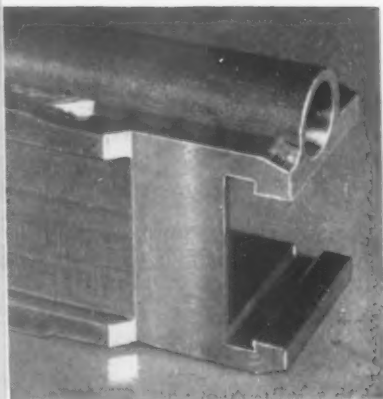
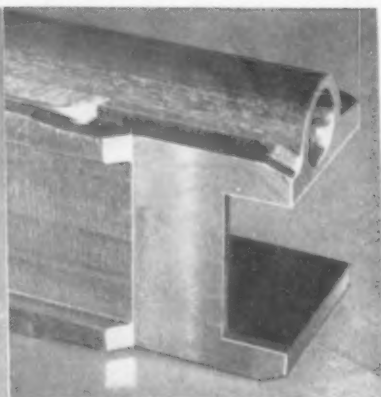
Another vertical broaching machine, with form broach-



RIGHT:
Receiver body for
the 20 mm. aircraft
cannon, before
broaching the dovetail
slots.

LEFT:
Vertical broaching
machine with form
cutters that machine
the dovetail
slots in aircraft
cannon receiver.

RIGHT:
Dovetail slots are
shown as broached
in the rear end of
the aircraft cannon
receiver body.



ing cutters, was applied to produce a dovetail slot in the rear end of the 20 mm. receiver body. Angularity and lack of clearance involved in machining the slot discounted the practicable use of milling equipment. And, though a tool room slotter type of operation was possible, it was considered impractical because 12 to 15 machines and as many highly skilled operators would have been needed for the required output. Broaching the dovetail enabled the plant to meet production schedules at low cost.

Boring

BORING the tapering contours of the powder chamber in the 75 mm. tank cannon tube is an exacting operation. Surface finish, concentricity, and accuracy with regard to the line of bore vitally affect performance.

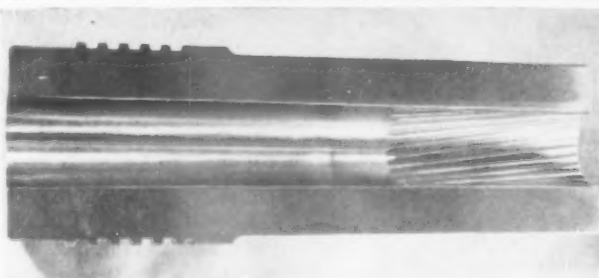
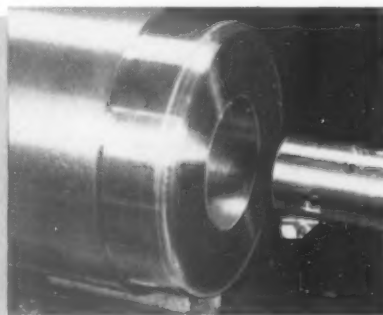
Working with a well known machine tool company, production engineers searching for a faster machining method investigated the applicability of diamond boring. One obstacle was presented in the design of the chamber. A tapered hole with forcing cone angles and straight sections, had to be bored between forcing cone angular sections. However, precision control by means of a cam follower was required of any method.

Perhaps the greatest disadvantage in the use of a conventional turning application was the need to revolve the tube at a high peripheral speed to obtain specified surface finish. Rotating a mass of several hundred pounds at the required speed turned up a vibration stage which could not be controlled.

The solution was found in developing a boring spindle which could be mounted on anti-friction bearings of high precision. Thus, the heavy tube was maintained in a stationary position, while the tool was fed longitudinally as well as in a cross-axial direction to produce the correct tapers. Six diamond boring machines replaced 12 standard lathes equipped with cam followers.

**Diamond boring
spindle used on
irregular form.**

**75 mm. tank
cannon powder
chamber as cut-
away section.**



Streamlined Production

Streamlined Production



Internal surface grinder, showing projecting arm and the grinding wheels, as developed for finishing the internal surfaces on the 75 mm. tank cannon breech ring recess.

Grinding

TIME-CONSUMING hand scraping has been eliminated in finishing the internal surfaces of the breech recess on the breech ring of the 75 mm. gun by an unusual grinding application. Grinding wheels are secured to steel plates mounted on both ends of a vertical spindle which is projected on a horizontal arm into the recess. Top and bottom walls are thus ground in one set-up.

After two machine companies had questioned the practicability of the projecting head, a third machine tool manufacturer, working from rough sketches supplied by Oldsmobile, developed improvements in their own Engineering Department, then designed and built the equipment. Power for the spindle is transmitted by belt through the arm, which remains stationary while the part travels on the table, and is raised or lowered in feeding to the wheel.

The arm, a casting, provides all the rigidity required by the job. Grinding wheels of an approximate cup-shape are used. Grooving the wheels aids cooling, and helps prevent wheel loading. One additional point of interest in feeding the work is that the faces are not parallel. When the top face has been ground, the bottom face is then positively indexed to travel in plane with the traverse of the machine head. By this method, two surfaces not in plane with each other are ground at one setting by the same unit.

It is estimated that hand work on the breech recess, at

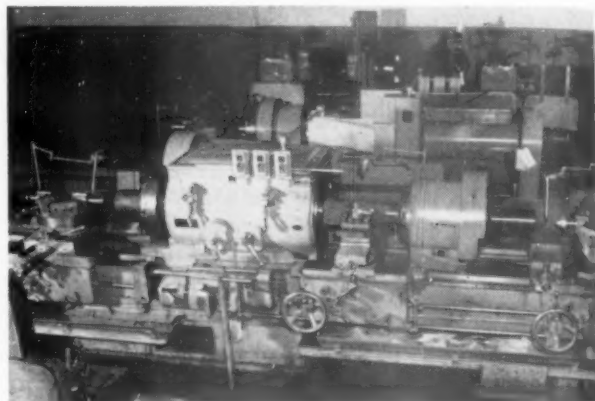
the rate of 100 breech rings a day, would have required 30 skilled operators. Four men, operating four machines in much less floor space, can do 40 per cent more work.

Special Machines

UNIQUE COMBINATION of standard units resulted in a "special" machine for establishing the I. D. and O. D. of the 75 mm. gun tube. Beginning with the location of the tube in the fixture by means of a tell-tale indicator, the operation proceeds so that metal is removed from the bore at both ends, from the outside surface at both ends, and in the center, simultaneously.

Oldsmobile production engineers developed the idea for combining operations in this way in order to achieve certain definite economies. Several machine tool companies were approached, and two helped perfect the combination of standard units which achieved a special machine application, yet still complied with Ordnance regulations to the effect that contractors should refrain from asking the machine tool industry to build specially designed machines.

All operations must be concentric with each other, for



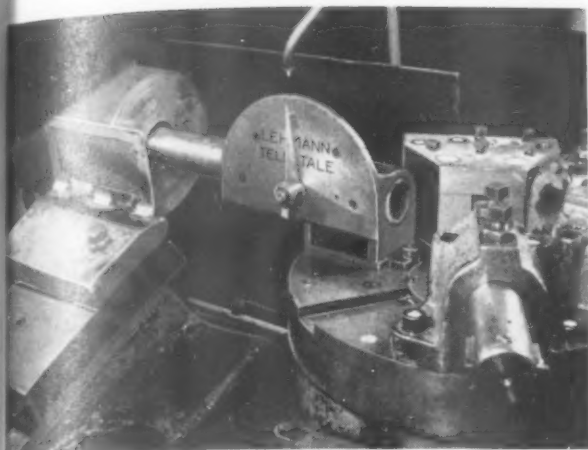
Unique application of standard units produced a "special" machine for establishing outside surface and inside dimensions for boring the tube of the 75 mm. tank cannon.

these dimensions are not only important in themselves, but they provide accurate locating surfaces for following operations.

From a technical standpoint, the great benefit of the special development is that the gun tube can be chucked within its length, instead of at the ends. Chucking either end in the head stock of a conventional lathe meant that two set-ups were required in establishing the I. D. and O. D. at each end of the tube. Generally speaking, there was little hope of actually producing concentric diameters.

As set up at the Oldsmobile plant, all diameters are established with relation to the same mounting in the double-end lathe. Locating surfaces are not only concentric, but are interchangeable in later operations.

Man-hour savings of 3.4 hours per piece were effected by substituting nine of the double-end standard machines,



Telltale indicator permits proper location of tank cannon tube for machining to develop inner and outer dimensions.

with attachments, for from 25 to 30 conventional turning machines.

The method of turning down the O. D. on 75 mm. armor piercing shot, and drilling and reaming the shell cavity, as engineered at Oldsmobile, is typical of the automotive industry's application of high production equipment. Eleven multi-operation machines replaced 12 vertical precision lathes and 11 drill presses. Of the drill presses, five were 21" capacity, used in drilling the centering hole, and six were standard machines for drilling and reaming the shell cavity.

The man-hour requirement was more than halved, in-

Multiple-spindle machine which drills centering hole in 75 mm. armor-piercing capped shot, reams cavity, and finishes outside diameter in one chucking. Eleven of these machines replace 12 vertical lathes, 11 drill presses.

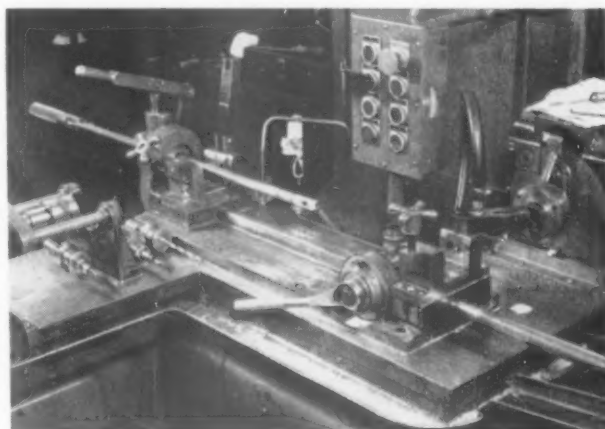


cluding time saved in reducing chucking operations from three to one.

Though not strictly a special machining application, the use of multiple tooling in turning illustrates making the most of another high production method. A good example is the simultaneous engagement of eight single-point tools to turn down the barrel of the 20 mm. cannon. The length of tool travel is reduced and production is speeded proportionately.

Work Location

MACHINING the gas outlet hole through the wall of the 20 mm. aircraft cannon demanded special attention to a difficult locating problem. The gas hole must be located with relation to three vital points: it must be central between rifling lands (rifling must therefore be performed first); it must be accurately located with relation to the breech end of the gun; and it must be related to the radial position of the indexing hole at the breech end



Locating tool which turns 20 mm. aircraft cannon tube to exact position for correct drilling of gas outlet hole.

of the tube, as well as to the thread machined on the breech end of the tube.

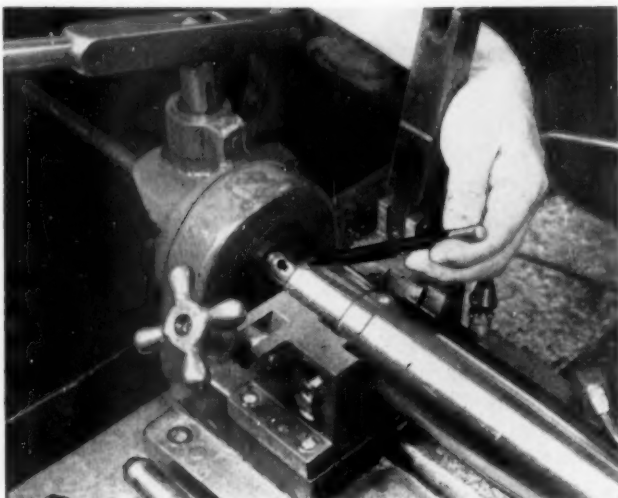
Together with the engineers of two well known machine tool companies, Oldsmobile worked out the various procedures and tooling required to meet this unusually complicated problem.

A locating tool, inserted to follow the rifling of the barrel, turns the barrel to the exact position, with relation to threading and index hole at the end of the barrel. Exterior stops on the fixture position the part with relation to the distance from the breech end. Once located, a small horizontal drill head advances, the tool is guided through a jig, and the hole is drilled.

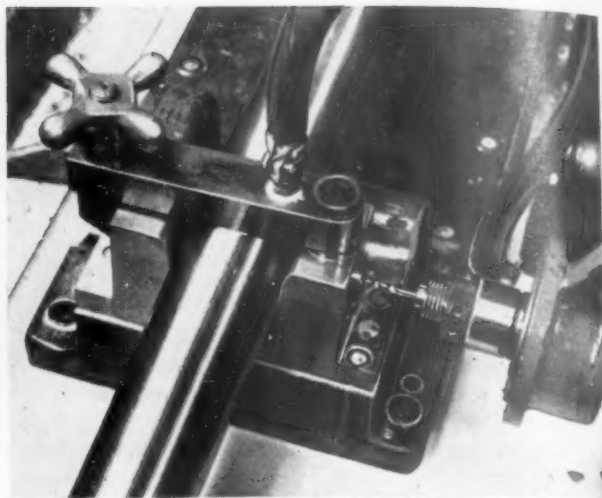
Though Ordnance Department specifications for finishing the breech ring of the 75 mm. tank cannon do not permit the appearance of locating holes which have no other function, Oldsmobile obtained permission to establish a

Streamlined Production

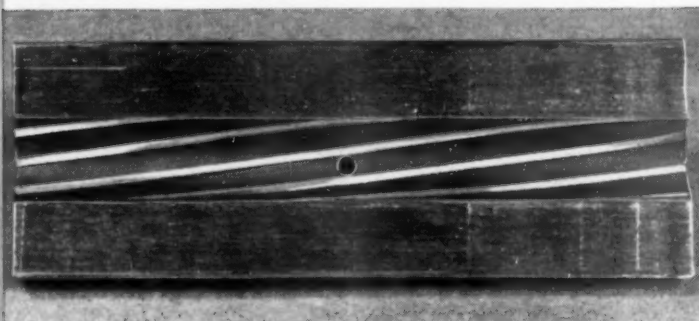
Streamlined Production



ABOVE:
Locating tool, about
to center the barrel,
follows the spiral
rifling in the 20 mm.
aircraft cannon tube.



ABOVE:
Drilling gas outlet
hole in 20 mm. air-
craft cannon tube.



LEFT:
Cut-away of cannon
tube shows gas out-
let hole, centered be-
tween rifling.

master surface and two locating holes at the start of the machining process. Used throughout the sequence of operations on this part, this provision enabled the company to speed production, eliminating the possibility of accumulative error and saving approximately two man-hours per part machined.

Though only common sense was needed to effect this saving, the solution to the problem, entailing an extra operation, is worth noting. It provides better control for producing high-quality work, and also permits comparatively inexperienced labor to be employed—that is,

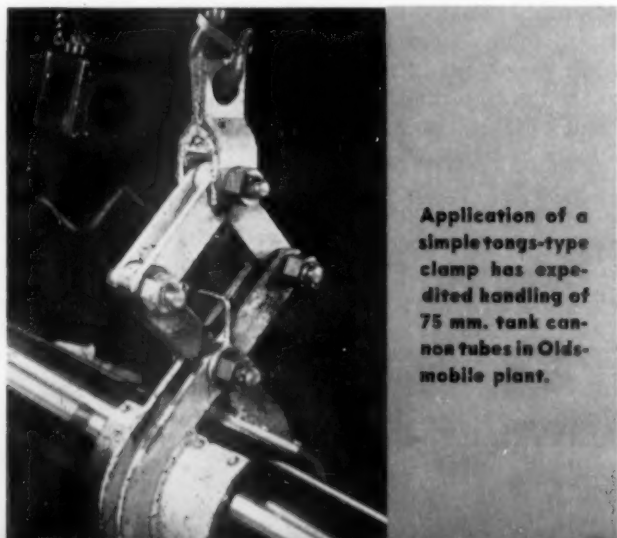
men without skilled techniques or many years of experience in mass production of precision-built parts.

MATERIALS HANDLING

IN IMPROVING the handling of gun parts, a simple device was perfected which warrants description because of the interest it has attracted from Ordnance manufacturers. Probably much of the attention value can be ascribed to that aggravating sense of wondering, "Why didn't I think of that?"

Instead of using rope slings and cranes to move gun tubes from operation to operation, a leather-faced, tong-type clamp was designed which grasps the tube firmly, gaining its purchase from the tube's weight. When first used in combination with a high-lift, fork-truck, this device enabled the plant to gain greater travel time from the trucks, speeding parts handling. It also added a greater degree of safety in handling the heavy pieces. Later, when applied to overhead crane equipment, the same advantages naturally were realized.

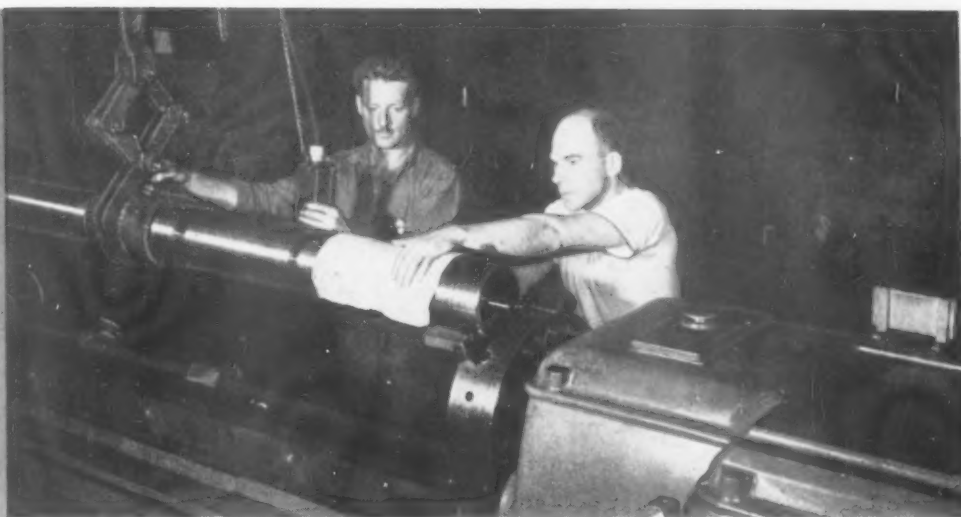
Manufacturing 75 mm. armor piercing shot requires soldering the cap to the body prior to a crimping operation. Oldsmobile increased production per man-hour through



**Application of a
simple tongs-type
clamp has expedited
handling of
75 mm. tank can-
non tubes in Olds-
mobile plant.**

THE TOOL ENGINEER

Tongs-type clamp, operating from an overhead crane, as it used to remove gun tube after a machining operation.



the use of a monorail conveyer, whereby one man removes the cap and body from a pre-heating furnace and loads them on racks suspended from the conveyer by means of rigid rods. Following the monorail, parts are dipped first into the fluxing acid, next into a thermostatically controlled solder bath. As the conveyer lifts parts from the solder, operators assemble the components in a setting fixture.

This semi-automatic method produces a more uniform job of soldering and requires but one fluxing bath, one pot of solder, two setting fixtures, and seven men to meet the production requirement.

The newer method replaces manually brushing each cap and dipping each shot in fluxing acid, then dipping them in a soldering pot and assembling in setting fixtures. Nine acid pots, nine soldering pots, five setting fixtures, and 12 men would have been required to meet the schedule. Space needed would not only have been larger, but would not have permitted orderly arrangement around the pre-heating furnace as at present.

Obviously, such savings as are made in floor space may extend beyond the particular operation involved. Permitting a more streamlined flow of materials to adjacent operations, the economies are frequently far-reaching.

FORGING SHELL CAVITIES

IN MANUFACTURING high explosive shells, two procedures may be followed in forging the shell cavity:

1. Forging to final dimensions.
2. Rough forging, followed by machining.

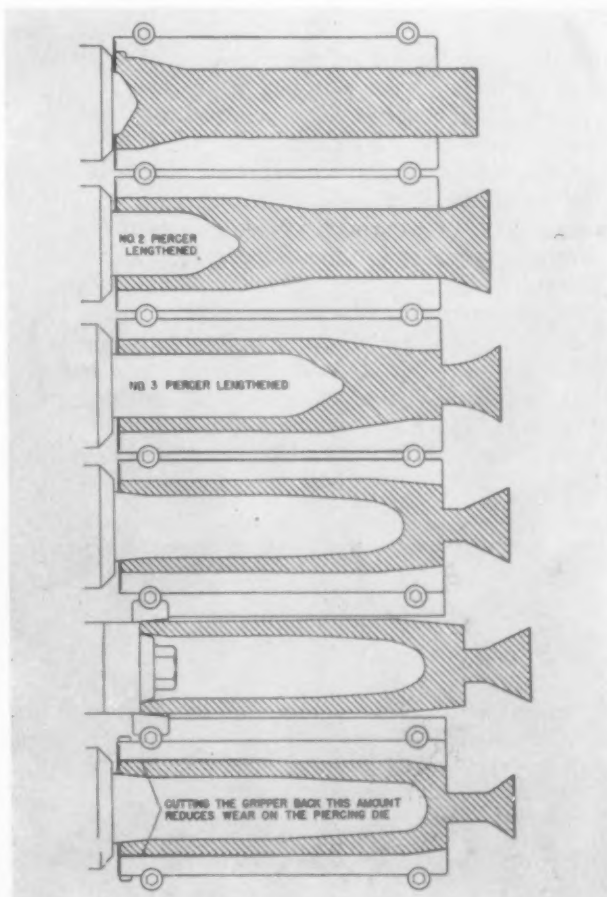
The latter method is preferred by many manufacturers because of longer die life. The Oldsmobile production engineering department believes that this provides no material gain because machining to size removes about one-half pound of metal from the 75 mm. shell and approximately twice that amount from the 105 mm. size.

Machining requires considerable man-hours and equip-

ment. Ten six-spindle multi-operation machines—efficient machines for this type of operation—would be required to meet the Oldsmobile schedule.

But not content to rest the argument while points for

improvements in design of piercing dies increased life of dies and permitted forging shells to final dimensions.



Streamlined Production

Streamlined Production

one side could be said to check with points for the other, this company gained a favorable production advantage in forging to final dimensions by increasing die life as follows:

1. Improving piercing die steel.
2. Cutting back the gripper on the section of shell pierced in previous operation.
3. Lengthening the depth of piercing in number 2 and 3 stages.

These and other improvements have increased die life to the point where it is comparable with the life obtained in rough forging the cavity. For example, the life of the number 6 piercing die has been increased 334 per cent,

which alone provided a substantial reduction in cost per forging.

The following table pictures the requirements of each method.

	ROUGH FORGING	FINISH FORGING
Die Life	30,000 parts	28,000 parts
Machines required to finish	10 Multi-au-matics	
Machine Operators	10	
Metal machined from cavity	1/2 pound per shell	

MATERIALS CONSERVATION

BY ABANDONING conventional methods of sampling steel billets used to forge 75 mm. and 105 mm. high explosive shells, Oldsmobile production engineers have saved men, materials, and machines. Ordinarily, two wafers are sawed from each bar of stock, to be analyzed to determine the quality of steel used. The faces of these wafers, representing the cross-section of the bar, were polished and stamped for identification, then etched in acid for visual inspection of piping, porosity, and spongy centers. This required four saws, two operators, and a man to make laboratory checks.

Oldsmobile developed a streamlined process of etching the end of the billet rather than sawing the wafers from each bar, enabling the plant to keep a constant flow (from shears to upsetter) in actual production without storing billets for laboratory.

In producing the 75 mm. shell, 125,000 bars, 17' 9" long are required for one million shells. Sawing 1/2" of stock from each bar for 2 wafers amounted to scrapping 5208 feet of steel billet—enough material to make an additional 4670 shells.

On 105 mm. shell production, 1,000,000 shells required 166,666 bars, 18', 4 1/2" long. Sawing 1/2" of stock from

each bar amounted to 6944 feet of steel billet, or metal for 4538 shells.

A change in materials specifications for capped shot resulted in large savings in vital metal and a reduction in machining time.

Originally, a high-nickel, high-chrome alloy was specified. Oldsmobile obtained permission to alter the alloy requirement, going to a lower alloy. In 1,000,000 caps, 18,990 pounds of chromium and 110,400 pounds of nickel were saved. Approximately six times this amount was conserved in production of the shot body.

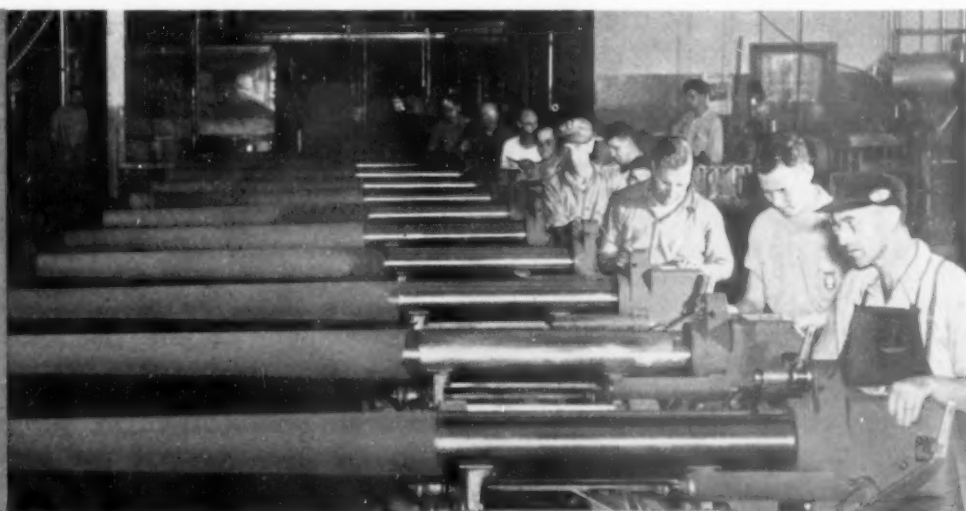
Machining costs were reduced approximately 40 per cent.

Another materials saving was effected by conversion from sawing of billets to shearing. Two shears replacing eight saws saved 1" to 1-1/2" of metal per billet. In 1,000,000, 75 mm. shells, savings were equal to the amount of metal required to produce 14,030 shells.

Incidentally, shear life proved to be four to five times greater than saw life.

THE END

Final assembly of 75 mm. tank cannon. A last vital inspection and test of firing pin action is performed.



Arc Welding Wins Its Spurs

Development of positioning equipment set the stage for a major production role for the forerunner of the modern welding process

ELECTRIC ARC WELDING is among the techniques greatly expanded by the war. Today several thousand times as much steel is being fabricated by the electric arc process as was the case three years ago.

Welded construction of Liberty and Victory freighters, the shift to the welded Sherman tank, and adoption of the arc welding process in fuselage manufacture are three production techniques in which arc welding has made great and much-publicized strides. Its use to fabricate housings and other parts for machine tools and diesel engines is another instance of hundreds that might be mentioned.

This art is by no means new. Like riveting, and pouring of castings, arc welding is old. To a more or less restricted degree, arc welding has been used for many years largely for repair work. Now its application has broadened as a direct rival of casting.

REDUCES WEIGHT AND COST

A welded part or sub-assembly formed of rolled plate, bars, and shapes is lighter than a similar cast part, sometimes by as much as 50 per cent, and is far stronger. The hazard of hidden flaws largely is avoided. In welding, it is easier to keep the part flat or straight and many difficult parts that would give a foundryman gray hairs can be formed and welded without difficulty. Stresses, almost certain to exist in a casting, can be relieved by this more exact method of fabrication.

Where arc welding has replaced riveting, greater fabricating speed and strength are obtained at lower cost. An all-welded American tanker is reported to have withstood the blast from a brace of torpedoes. Although the deck plates buckled from the explosion, they nevertheless took much of the "kick" out of the blast, and the bulk heads held.

Several years ago when arc weld-

ing was almost exclusively the spark-shooting tool of the repair shop, industry took it lightly. The factory had an outfit, of course, largely for use of the millwright or maintenance crew, but it was considered merely a repair unit.

Today arc welding is a tool of production. Completely equipped welding departments are manned by staffs of expert welding engineers and equally skilled fabricators. Thus production is speeded and the product made lighter, stronger, and more attractive. And, equally important, costs are reduced.

Professional welding companies also have come into existence recently as welded steel fabricators. Working from blue-prints, they form and weld parts and sub-assemblies for an ever-widening range of manufacturers. They now stand alongside the commercial steel foundries that provide cast parts. Many welding companies maintain engineering staffs to assist customers in making design changes so that as much of the product as pos-

sible can be of welded construction. Welding positioners have been essential tools to this progress.

VARIED EQUIPMENT USED

The United Welding Company of Middletown, Ohio, a large and well-equipped fabricating plant mounts work on both pedestal and skid type positioners, all electrically operated and push-button controlled. The use of positioners permits the work to be so placed that all welding is down hand, resulting in faster and better work. Other major equipment items include a Pantograph burning machine, a mammoth $\frac{1}{2}$ " by 12' press, a giant shear, annealing furnaces of 16' by 8' by 8' capacity, and sand blasting equipment.

Fabricating a combined gear casing and end housing assembly for a diesel engine, Figure 1, posed a difficult problem. It was constructed from rolled steel plates, bars, and shapes. The side plates were burned from the top plate, and bearing pieces were formed from bars burned to

FIGURE 2.

By use of a positioner, "down welding" is possible on all operations on a diesel engine frame, assuring greater speed and a better welding job.

United Welding Company photos

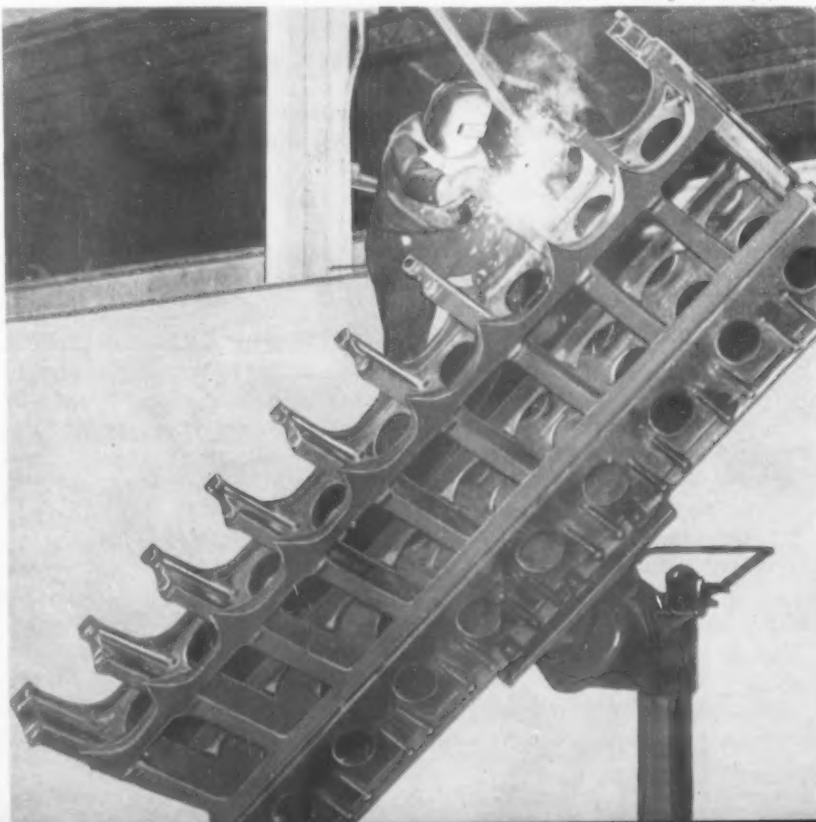




FIGURE 3. Boring mill housing is fabricated by arc welding. Built from rolled steel, 114" diameter and 43" high, it weighs only 6½ tons.

shape. The various sub-sections involved were assembled in jigs to make all casings interchangeable.

These sub-sections, or assemblies, were then brought together to form the complete casing. The next step was a trip to the annealing oven for heat-treatment to relieve all stresses that might be present. Straightening and sand blasting completed the job.

DOWN-WELDING ON POSITIONER

Relatively light in weight, the casing was stronger than a comparable part of cast construction. It was freed of stresses and strains that might cause failure because of concussion or other forces. Further, the cost was measurably less than would have been the case had patterns been made and the parts cast.

Next to weight saving, the greatest advantage in forming this diesel gear casing by the welded sub-assembly process was the certainty of getting a good piece. To cast it would have been difficult, since a satisfactory casting of such a complicated structure without several unsuccessful tries would have been unlikely. This particular part was 60½" high, 46" wide, 12½" deep, and weighed 1875 pounds in the rough.

A diesel engine frame, Figure 2, is shown tilted on a positioner so that all operations can be "down welded" for better welds and greater speed. This assembly is made up of 102 parts, including forgings, square welded tubing, alloy plates, and SAE 1020 steel, and weighs 1800 pounds. Most

of the joints are ⅜" fillets and there are 450 feet of welded joints. Jigs and fixtures are used extensively in manufacturing this assembly. The maximum allowable variation is plus or minus 1/16".

A main housing for a 16-cylinder diesel engine is fabricated from 248 pieces (same assortment as from the assembly shown in Figure 1) joined by 800 feet of ⅜" fillet welds. The completed assembly weighs 2010 pounds. Jigs and fixtures are used extensively in fabrication. Allowable deviation from standard in this assembly is plus or minus 1/16".

Many machine tool bases have been formed on production schedules. The

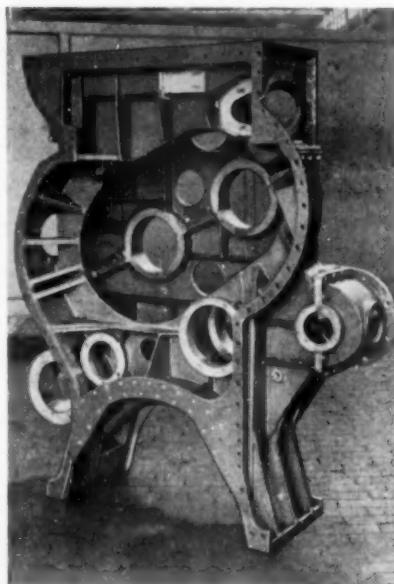


FIGURE 1. Gear casing and end housing assembly fabricated by arc welding at lower cost than would have been possible with conventional casting.

boring mill base shown in Figure 3 was fabricated of rolled steel plate, bars, and shapes and is 114" diameter and 43" high. The weight was held to only 6½ tons. Several fluid tanks also were welded into position.

An example of lower costs inherent in welding is represented by fabrication of rounded corners without machining. Coolant troughs, fluid tanks and other features can be more readily built integral with the tools.

In forming a hydraulic press frame with rounded corners, heavy steel plate was formed on a ½" by 12' press. The entire structure was fabricated from two plates. All stress was relieved, parts were annealed and blasted, and table plates were pre-machined. The completed frame con-

tains a leak-proof welded oil tank. These welded presses range all the way from 15 to 300 tons capacity.

WELDING REPLACES CASTING

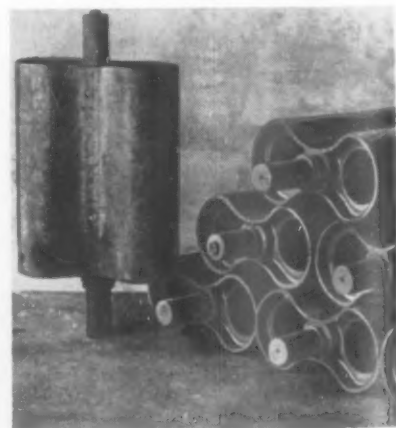
An interesting problem recently worked out at this progressive plant was a method for forming a 122" re-winder drum for a paper mill. Two ⅜" plates consisting of 180° segments formed and welded were used. The chief problem was how to fabricate the part so that it would be straight and also check for balance, since it was a revolving part and any eccentricity would be fatal.

A 61" beater roll for use in a paper mill, weighing approximately five tons, is built from 62 bars 54" long, 5" wide and ⅝" thick, welded longitudinally around its circumference. The spider, which supports the structure, is made up of ¾" stock and the hub is 1½" in diameter. The assembly is held together by 6200" of ⅜" fillet welds. Distortion from heating is held to a minimum by having two operators work opposite each other at all points in the process of fabrication.

Figure 4 shows the fabrication for marine pump impellers. These units are made in sizes ranging from approximately 20 pounds to 1300 pounds each. Such assemblies replace castings, which were found objectionable because large numbers were rejected when machining disclosed holes and imperfections. The average thickness of the welded material is ½". These units are built to very close limits as they must be dynamically balanced.

THE END.

FIGURE 4. Arc welding in close tolerance work. These marine pump impellers range from 20 to 1300 pounds. They must be dynamically balanced.



TOOL ECONOMY

WITH CHANGE, industry inevitably tends to lose its stride. Many production engineers are facing change, most of them to new war contracts, a few to the possibility of resuming limited production of civilian goods. Still others, who are producing the same product, must meet alterations in schedules, return to fabrication from higher alloys, or, as with certain shell manufacturers, change from steel back to brass. Those not facing change must still be ready for it. In all this, we cannot afford waste or unnecessary expense on the production front anymore than we can afford it in opening another fighting front.

Though the cutting tool situation is better than it was a year ago, we must beware of a false sense of security. As dangerous as any idea that the war is as good as over would be the idea that tool economy is less important today. With change, our tool cribs must be in order. We must know what we have, where our tools are, what shape they are in. Prepared for whatever job lies ahead, we must maintain our tools, provide for their economical use, store them properly, salvage them when possible. That

is the function and objective of tool economy.

Tool economy ranks in importance with any other phase of production. Throughout 1943, THE TOOL ENGINEER presented numerous articles, featuring the correct application of tools, the first step toward their economical use. Articles devoted to particular machining jobs highlighted "how-to-do-it" information on the proper use of tools involved.

Striking a broader note were features on tool control and tool salvage. From simplified numbering systems, to methods of centralizing grinding and standardizing shapes, to techniques of welding and brazing broken tools, those articles hammered home the need for tool economy, and the way in which it might be achieved.

The following articles will make a worthwhile addition to that broadly applicable file of material. They describe recent developments in systematic tool maintenance, tool repair and tool application. Originating in plants building specific types of products, they nevertheless concern problems common to most production engineers.

Boost Production Efficiency With a Tool Control System

A MODEL TOOL control system in a mass production plant should increase efficiency in grinding, inspecting, storing, maintaining, salvaging, and disbursing of cutting tools. Outstanding among such recently installed systems is one at the Grand Rapids Stamping Division of Fisher Body. The new system there has made it

possible to maintain high machine production, to consistently raise the quality of the finished product and decrease the amount of scrap and deviations, as well as increase the life of cutting tools.

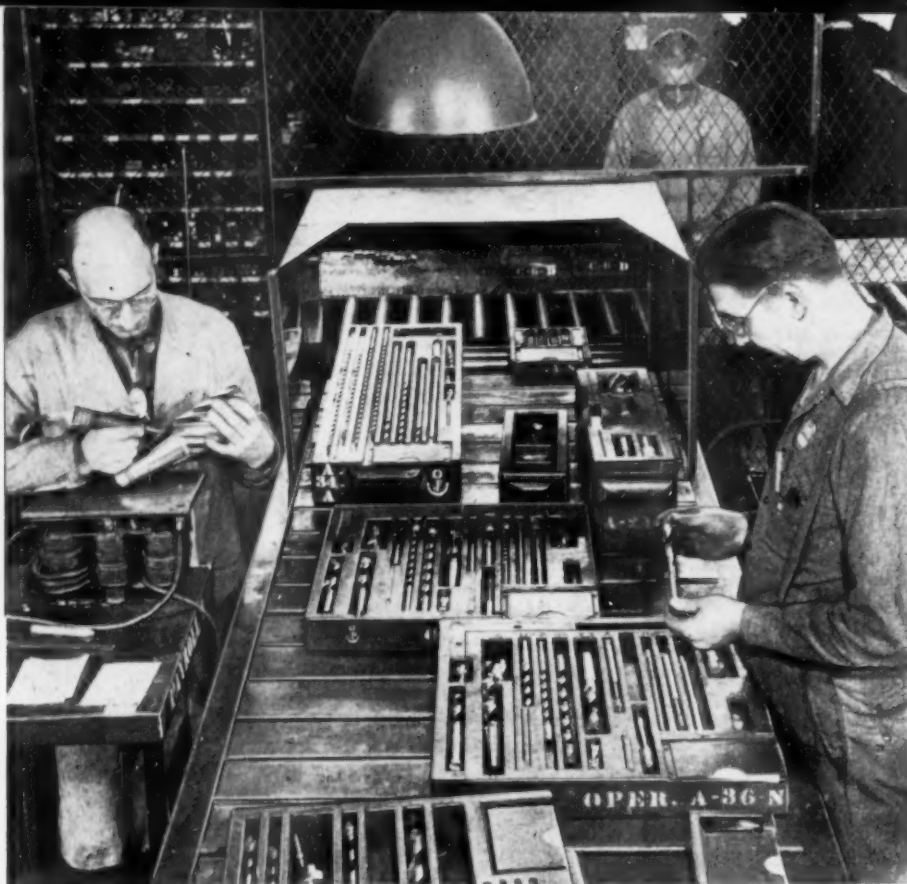
This system was an outgrowth of the knowledge that cutting tools will last much longer and perform better if

they are regularly inspected and sharpened. To accomplish this point a plan was evolved in the General Motors' division whereby sets of tools would be scheduled to the machine according to the operation to be performed on those machines. The tool sets comprise the entire complement of tools necessary to complete the op-

Every tool receives a thorough check as it returns from the production area in the Grand Rapids Stamping plant. Dull, broken or damaged tools are removed from the sets for sharpening, repair or replacement.

Fisher Body photos and drawing





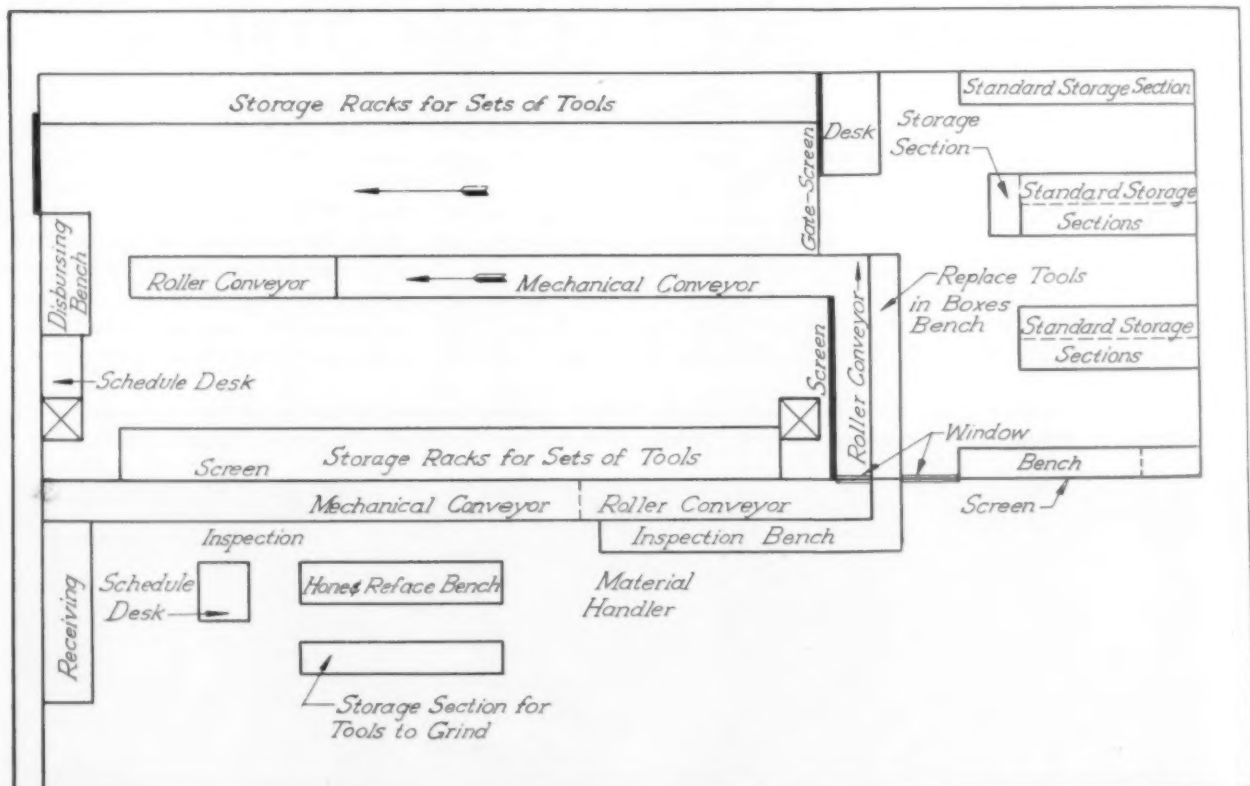
After perfect replacement tools are added to sets in the tool bank, a conveyor moves them to the disbursement crib where they are checked for code and set numbers. These must correspond to operation numbers on the box.

eration. The length of time which a set of tools would remain on a job was determined by an actual performance check which governs the replacement cycles upon which the tools are scheduled to and from the machines.

All tool sets are delivered to the machines an hour in advance of the time needed, as a precautionary measure. Machine and man-hours are not lost to the production job for lack of the tools to do that job. Code numbers assure proper delivery of each set of reground, salvaged or replaced tools to the machine.

Grinding and disbursement cribs, along with the tool bank storage, are centrally located within easy reach of all machine areas. Dispatching of

Here are details on a plant-wide tool control system which has reduced production costs and boosted product quality. Scheduled pick-up, grinding, replacement, inspection, and tool disbursement are facilitated by fork trucks and conveyor system



Layout of Grand Rapids Stamping Division's centrally located grinding and disbursement cribs and tool storage bank.

all tools to and from machines is controlled by the Production Scheduling Department, and deliveries are made by routed trucks which also maintain a regulated schedule.

Tool sets, returned from the floor, are inspected upon receipt. Damaged, broken, and worn tools, along with those which need sharpening, are removed and a tool replacement slip bearing the code numbers of the tools is placed in the box.

The containers then pass along a conveyor to the bank stock area. Perfect replacement tools are added to the set, after which it is passed along the conveyor to the disbursement crib for storage until needed.

Dull tools, after being removed from the sets, are ground and honed, rigidly examined, sealed and replaced in the bank stock to await future use. This tool control system has enabled the Grand Rapids Stamping Division to maintain high production sharpening of precision cutting tools as well as conserve tools and reduce lost time in man hours and machine hours on the production operations.

THE END



High-lift fork trucks, running on a regularly scheduled route between production machines and grinding and disbursement rooms, pick-up and deliver tools.

Heat-Treating "Moly" High-Speed Steel

Heat-Treating Procedure

WITH THE CONTINUED interest evinced in the use of molybdenum-bearing high-speed steel, the heat-treating experience of the General Railway Signal Company in working with this type of steel should prove to be a worthwhile addition to data already presented on this subject. In its conversion from the use of the 18-4-1 tungsten variety to the use of molybdenum, better results have been recorded in working with certain types of tools.

For the past three years, General Railway Signal has been turning 105mm. and 75mm. shells. When they started, they used the 18-4-1 high-speed steel straight forming tools for turning band grooves in a Bullard Mult-Au-Matic. At that time, tools which were purchased from outside sources had a Rockwell C reading which did not exceed 64, and they suffered considerably from breakage.

In making their own tools, the company used the same type of steel, and experienced the same difficulties until concentrated study resulted in

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GENERAL RAILWAY SIGNAL COMPANY

development of the correct draw which overcame the breakage problem. However, the production obtained from the tools between grinds was not entirely satisfactory.

Just about that time, the War Production Board was asking manufacturers to buy molybdenum steel with tungsten, in a proportion of three to one. Without proceeding further to solve the problems of working with 18-4-1, the tool engineers decided to use molybdenum entirely on the job. A heat-treating practice was developed which produced a tool with a hardness of from 66 to 67 on the Rockwell C scale.

Production per tool has increased over that obtained with 18-4-1, and breakage has almost disappeared. The extra hardness obtained with the molybdenum variety made the difference between low and high production.

The company's production and tool engineers are now of the opinion that molybdenum steels offer a better solution to their high speed steel prob-

lems, particularly in the use of circular form tools, straight form tools, milling cutters and similar tools. Generally, they have attempted to keep their stock within the range of the 662 or 552 varieties, taking the regular run of stock as it came to the plant.

Using atmosphere controlled electric furnaces, 6-6-2 and 5-5-2 molybdenum steels are pre-heated to 1650° F. and then transferred to a high temperature furnace set at 2240° F. The time required to arrive at a quenching heat is closely checked, and tools are withdrawn promptly.

Tools are quenched in oil which is not allowed to cool below 110°—120° F. It is kept in motion from the bottom of the tank to the top. The Rockwell C reading after quenching runs from 64 to 65. Work is then drawn in a salt bath for two hours at 1025° F., raising the hardness to 65-66, Rockwell C. It is then finish ground and checked and given a second draw of two hours at 1025° F., and shows a final hardness reading of 66-67, Rockwell C.

THE END

Tool Economy

GET THE MOST OUT OF SMALL TOOLS



Individual tool grinding rooms cut production costs

General Electric photos

Each production division maintains its own tool grinding section equipped with necessary grinding machines for resharpening particular tools and cutters used in that department.

IN A PLANT as large as the General Electric Company's Lynn River Works, which produces a number of radically different lines of apparatus, the maintenance and reclamation of small tools must be flexible enough to meet the needs of the various manufacturing departments.

Ordering of new tools and supplies and reclaiming and disposal of old, non-durable and portable durable tools are centralized in the "expense tool department" to obtain maximum over-all control. Maintenance of non-durable tools, however, is decentralized into each manufacturing department to obtain maximum flexibility, speed, and direct responsibility for maintenance service.

Each manufacturing department maintains its own tool crib for storing and dispensing tools and supplies, its

A. D. FORBES

SUPERVISOR, EXPENSE TOOL DEPARTMENT
LYNN RIVER WORKS
GENERAL ELECTRIC COMPANY

own tool grinding section equipped with grinding machines required to sharpen particular tools and cutters used in that department, and its own tool and machine maintenance section which handles repairs to tool bars, holders, fixtures, and machine tools. When a manufacturing department has more than one tool crib, the grinding section is near the largest crib.

Used tools returned by operators to crib windows are inspected carefully. If reconditioning is necessary because of abuse or machine troubles, the operator is required to show his foreman the tool and explain how the damage occurred.

If the trouble is due to machine or

fixture trouble, correction will be made to prevent recurrence. If damage is caused by abuse, the operator is carefully instructed as to proper use.

If a tool needs resharpening because of normal wear, it is delivered to the tool grinding section. Here a determination of the most effective grinding process for each application is made. After resharpening, the tool is carefully inspected before being returned to the tool crib.

Worn out and broken tools are sent from the various departmental tool cribs in locked boxes to the tool salvage section, which is a part of the central expense tool department. Here the tools are sorted carefully to determine disposition.

Tools that cannot possibly be used are sent to the general scrap department. Those that can be reclaimed

are sorted by types and sizes. Cutters, drills, and solid reamers that can be converted into standard sizes are sent to tool reclaiming concerns. Files and similar tools are sorted by types and sizes, bundles, and stored in racks. When a large enough quantity is on hand, they are sent to tool salvage companies, where they are recut or resharpened, depending on their condition.

Cutters and reamers are reclaimed by grinding. Drills are reconditioned by welding on new tangs, regrounding tapers, making taper shanks into straight shanks, and reducing diameters when margins are worn down. Cracked or broken expensive cutters are reclaimed by welding and grinding. Experience shows that the welded section is equal to and in some cases better than the original metal.

Odd-sized cutters, drills, reamers, and the like are stored in standard racks by sizes and types, where they are held for special applications. Many demands are made for such tools and many delays in production have been averted in this way. Generally, when changes are required, they are made in the apprentice or central tool department.

Short ends of forged tools and tool bits are salvaged by cutting them up into small sections which are welded to alloy steel shanks. Rawhide ham-

mers and mallets are restored by cutting the worn section off with a band saw.

Grinding wheels, when worn too small for work intended, are re-sized for other work. When cup or flare-type wheels are worn down to the back section, the back is made into a straight-side wheel. All wheels are

plating department, increasing their effective life eight to ten times. When worn undersized, they are lapped flat, round, or straight, as the case may be, after which they are plated with a "precision plate", .0001 inch to .0002 inch thick. No grinding is required after plating.

Worn and under-sized taps and

Production costs can be cut drastically by careful maintenance and repair of highly expendable cutting tools and gages, and their useful life can be extended as much as 400 percent

speed-tested after re-sizing. This work is done by wheel manufacturers.

Hack saws and metal band saws are reground three to four times before they are discarded. Actual operation shows that the reground saw will cut better than the new unground saw. Worn out, broken hack saw blades are used in the steel foundry for reducing the height of cores and various mold work, eliminating the purchase of wood rasps, which were formerly used.

Precision gage blocks, plug, pin, and other type gages are re-sized by chromium plating in the company's

reamers also are salvaged by giving them a flash coat of chromium plate .0002 inch thick. The effective life of taps in some cases has been increased as much as 400 per cent by this method.

Drill chucks, electric portable tools, pneumatic tools, pneumatic chisels, pipe wrenches, and similar tools are returned to their manufacturers for reconditioning. Experience has shown that it is more economical to have reconditioning work done by the manufacturer when possible, or by others who specialize in this work.

THE END



Tool Grinding supervisor inspects worn cutter

By careful examination of worn or damaged tools, the inspector determines whether wear may be due to machine or fixture trouble, or abuse. If failure is due to causes other than normal wear, remedial steps are taken to prevent recurrence.

Reground saws perform better

This General Electric shop regrinds saws three to four times, reports reground blades cut better than new, unground ones.



Tool Economy

Carbides Applied at Springfield Armory

SPRINGFIELD ARMORY, home of the Garand rifle, has increased tool life on certain applications by tipping or facing with cemented carbide. Reamers (.405") used to remove scale and some stock from operating tubes of Garand rifles, were wearing out after producing 20 to 40 pieces.

The Tool Salvage Department tipped one of the reamers with Carboloy cemented carbide blades. It produced 700 pieces before it was accidentally broken. A second carbide tipped reamer produced 100 pieces before requiring sharpening. The result of tipping all the reamers on this job was to reduce tool cost, conserve vital high speed steel and increase output through drastic reduction in shutdowns for tool changes. Figure 1 shows one of these reamers milled for brazing in of carbide tips.

Application of cemented carbide to a number of other tools at the Armory has resulted in increasing life 350 per cent on the average. Far greater saving than this was realized, however, in re-working a gun drill used on the gas piston tube in the

Browning automatic rifle. Life was jumped 1000 per cent.

In finish reaming the barrel holes of the gas cylinder on the Garand rifle, life per grind of reamers was stepped up from 500 pieces to 8000, after tipping with cemented carbide.

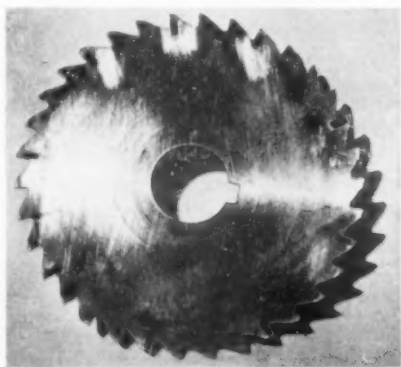


FIGURE 2. A 34-tooth saw, center unit of a gang of three, was salvaged by tipping nine of the teeth with carbide.

Important in this application was the reduction in the amount of gaging necessary to assure maintenance of size and alignment in a production run. Re-working of bores has been

FIGURE 3. The gang saws are used for milling the aperture slot in the base rear sight of the Garand rifle.

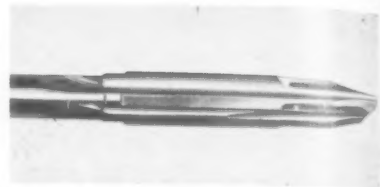
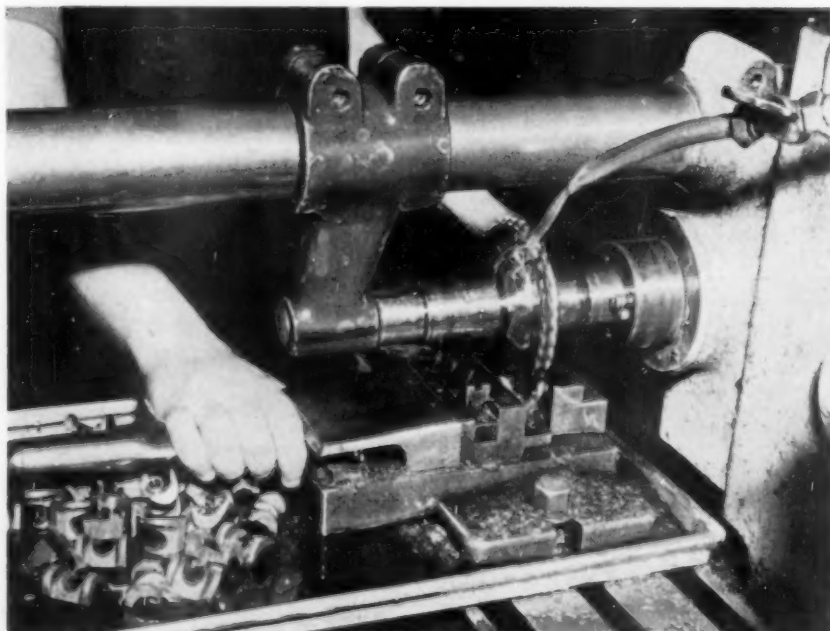


FIGURE 1. A .405" reamer is milled for brazing in carbide tips.

almost entirely eliminated as a result of the change—caused in part, possibly, by the freer cutting obtained.

Pitch bars for producing one of the springs for the Garand rifle were lasting only a short time, and difficulty was experienced in maintaining pitch of the spring. Tipping the pitch bar with cemented carbide increased the life almost indefinitely, some 110,000 pieces having been produced without significant wear on the tool being apparent.

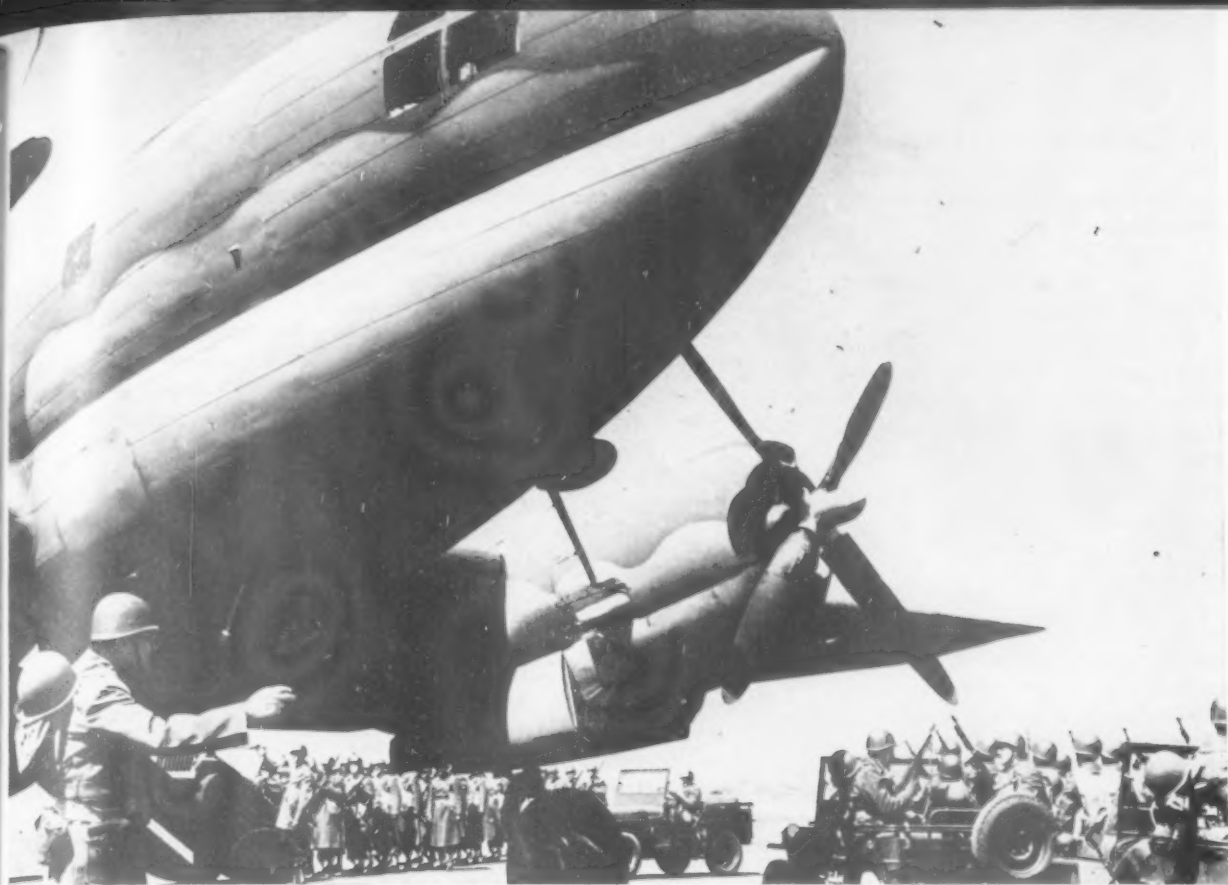
A 34-tooth saw (Figure 2), the center unit of a gang of three, was salvaged by tipping only nine of the teeth with carbide. This gang of saws is used for finish milling the aperture slot in the base rear sight of the Garand rifle. (Figure 3).

Prior to tipping with cemented carbide, the saw had produced some 950 pieces. First run after tipping was approximately 2600 pieces. It was then found that one or two of the teeth were slightly high, a condition that was quickly remedied by re-grinding to adjust tooth height and to distribute the wear. On the second run, 3199 pieces were produced before grinding became necessary. As a result of the performance obtained, a decision was made to tip every other tooth of all three saws of the set. This permits increasing cutting speed, which not only reduces machining time, but improves cutting characteristics for the carbide.

Tipping with cemented carbide has extended the life of such other tool forms as end mills, profile cutters, countersinks, and facing tools. Life of centerless grinder rests and snap gage anvils has been increased by facing with this material.

THE END

THE TOOL ENGINEER



Curtiss-Wright photos

Tool economy has vital bearing on expanded production of giant commando transports which speed troops and supplies to battle zones. As President Roosevelt said in his message to Congress, "There is only one front . . . When we speak of our total effort, we speak of the factory . . . as well as of the battleground."

Tool Economy

SAVE THE PIECES

TOOL CONSERVATION has been greatly aided in the Columbus plant of the Curtiss-Wright Corporation through establishment of a tool reclamation section, operated under the supervision of the tool and planning department.

When cutting tools are broken in production, they are routed through the tool crib to the tool reclamation department, which segregates such tools as drills, end mills, milling cutters, slabmills, form cutters, reamers, and plug gages. All tools are sorted according to repairs and salvage.

Number size or fractional size drills from 1/32" to 3/8" that have broken off at the juncture with the shank are scrapped immediately. If a portion of the shank is left (not less than 3/4") they are fitted by shrinking into a special collar shank which has been made up in advance. To fit standard drill chucks, these collar shanks vary in diameter, de-

EDWARD W. MARTIN

TOOL RECLAMATION ENGINEER
CURTISS-WRIGHT CORPORATION

pending upon the size of the drill, from 3/16" to 3/4" outside diameter. Drills are then reground for cutting edge and returned to the tool crib.

Milling cutters are sorted according to size and type. Records are then made on tags attached to the cutter with full information as to P. C. number, diameter, width, and any other special remarks for identification. They then are stored for repair in pans on shelves.

Matched broken cutter parts are first ground by hand or machine on a 45° angle to the fracture line on both sides of the cutter, so that the depth of the angle will leave approximately 1/32" contact along the line of fracture at the center. The cutter is then welded by the following procedures:

1. Preheating: The cutter is preheated evenly to a dark cherry red by

laying it on a face plate.

2. Cleaning: The ground angular surface of the broken cutter is cleaned with carbon tetrachloride, using a soft brush or clean cloth.

3. Fluxing: Cold flux is applied to the ground angular surface of the broken parts which are to be welded.

4. Welding: Flux applied to the heated broken parts will immediately melt. In welding, the rod is first dipped in the flux, heat is applied to the ground surfaces of the broken parts, and the material is slowly built up in the angular groove between the broken parts. The building up should begin at the center and work to the outside diameter, with the welding torch heating the surface of the part continuously. A rotary motion around the center, working from the inside, spreads the heat over the entire diameter equally. After one side had been welded, the cutter is turned over and the operation repeat-

ed. Best results can be obtained by using two torches, one for welding and the other for continuous rotary preheating.

Satisfactory welding rod, should provide a low melting temperature and high tensile strength.

5. Rough grinding: After welding, the cutter is rough-ground to remove surplus alloy on both sides and in keyway or bore. It is then etched or marked to show the date of salvage.

6. Finish grinding: The cutter is finish-ground cylindrically on the outside diameter, sides, and all cutting edges.

7. Testing: The cutter is tested for bound by its "ring". Tested on a milling machine, it is paced for proper feeds and speeds for steel or aluminum. Speeds and feeds are set up for tests on all reclaimed cutters.

8. Records: Results are recorded and the cutter sent to the main tool crib, where it is placed in a special salvaged tool section.

New shanks are welded onto the cutting base of end mills from which shanks have broken off. This is done by two methods—butt welding and chamfer welding. In butt welding, a new piece larger in diameter than the finished shank is used, in order to leave stock for finishing. The surface of the base should be ground flat so that it will fit the new shank piece, which also should be ground.

In chamfer welding, a chamfer is ground on the new shank on two sides to a 1/8" to 1/4" point. If any part of the shank is left on the base, this also is chamfered to the 1/8" to 1/4" point. All welding surfaces are cleaned with carbon tetrachloride.

Except that more alloy is required

in chamfer welding, the butt and chamfer methods are essentially the same. Placed in a jig, both base and new piece are aligned. After welding surfaces have been fluxed, both pieces are heated to a dark cherry red. Following preheating, butt ends are fluxed and coated with a thin skin of alloy, heat being maintained in both parts by use of the torch. More alloy is added and the pieces are pressed together and kept heated until a firm bond is established. Any crevices that develop should be filled. A two-flame torch maintains a uniform heat all around. The tool should be cooled, not quenched.

Flash is ground off by hand to speed the operation. The shank is turned and finished as follows:

The base is centered in a lathe chuck and the shank is turned down to a given diameter, the welded-on piece being centered so as to regrind the cutting edges on grinding machine centers.

HEAT TREAT BEFORE WELDING

All pieces welded to a base are heat treated before welding.

For safety, a key-weld, following the above procedure generally is made on tools used to cut aluminum at high speed. Salvage cost is less than 10 per cent of new tool cost.

When cutting edges have broken off milling cutters, a flat surface is ground at the fracture to provide room for building up new teeth.

Cutters are heated all over to about 800° F. to remove strains. Then the surface to be welded or built up is brought to a sweating heat, and a few drops of molten metal from the alloy rod are deposited and properly fused

in the surface. A continuous bead is then run, care being taken not to puddle with the welding rod.

In welding, the flame should be played to the outside and should be kept around the deposit to make it plastic. Metal should be allowed to flow to the desired shape; a thin oxide layer helps prevent the metal from running away. Metal must be flowed on at just the right heat, a technique acquired by the welder only after some practice.

The tool then is ready to be ground in the usual way. All flash or extra alloy that has been applied between the teeth should be ground out.

All scrap high speed steel tools are annealed, and cut up into tips to be used for inserts, which are welded to cold rolled shanks made up to the various standard sizes. Shanks are milled or recessed for various size tips, which have been cut to proper size to fit the shanks. Cold rolled shanks are rough-ground for standard cutting clearance.

For a good fit, tips which are to be brazed to shanks should be lightly ground on all brazing surfaces. After the shanks are preheated to from 1500° to 1700° F. (cherry red), recesses are fluxed well. An alloy ribbon then is fitted to the surfaces, making a casing for the tip to lie in.

A two-tip torch, developing approximately 800° F., produces good results. The tip should not be heated to the point where it will bind with the alloy. The shank should be heated to 1300° F. to cause the alloy to run and bind. After the brazing is completed by pressing the tip to the shank and holding it until bonded, the tool is cooled, but not quenched.

Steps show broken teeth, weld before grinding, welded V-groove where crack existed, and finished cutter.



Boeing's "Porcupine"

Piercing die produces 388 holes simultaneously in Flying Fortress part. In piercing nine other parts, to produce a total of 976 rivet holes, it handles gauges ranging from .064" to .150".

Hole location accuracy is to .0005", even where .167" holes are only .5" apart on centerline



Boeing photos and drawings

Boeing Aircraft Company's "Porcupine" and its 388 quills. This die produces bomb bay walkway parts 30 times faster than by the previous method. Punches are closely coordinated.

BELIEVED TO CONTAIN a greater number of closely coordinated punches than any other piercing die ever constructed for aircraft work, a recent die development by the Boeing Aircraft Company incorporates 388 punches with a hole location accuracy of .0005". In five press operations, it pierces a total of 976 riveting holes in the ten separate parts which comprise the walkway through the bomb bay of the Boeing Flying Fortress. One stroke of the sequence produces 388 holes, another 218.

Production of rivet holes is improved 34.01 times over the old method by the utilization of press piercing methods. Extremely close coordination of riveting holes permits more rapid assembly, further increasing the usefulness of the die.

Typical Americans, Boeing workers are quick to apply nicknames. Just as Boeing's circumferential Hy-

dro-Punch became the "Octopus" (THE TOOL ENGINEER, January, 1943), so the catwalk piercing die has become the "Porcupine".

More important than the multiplicity of punches, however, is the diversity of this die, on which are punched two differently sized and shaped sheet stock parts, two each of two different angle sections, and four extruded T-sections. Thicknesses vary from .064" to .150", all materials being 24ST aluminum.

Flexibility in the use of the tool was made possible by a plan whereby stripper plates can be changed with comparative ease and little time. Aside from this, the only changes made in the die during the five different press operations are in adjusting the stock pushers, and in indexing for the various types of parts.

The use of the "porcupine", a high production tool, was made possible by re-design of the catwalk. The new product design includes a primary web, or flooring, of .064" dural, and a secondary web of .125" alclad. The primary web receives the maximum 388 holes, while the secondary web receives 218. The two reinforcement angles, both on upper and lower sides of the walkway, are pierced with 51 holes each on the same stripper plate. Thickness of these parts is .150".

The second stripper plate is used

to facilitate loading the four T-sections in the die. The forward extruded T-sections receive 40 holes each, while the two after sections receive 43. At the point of piercing, these sections are .125".

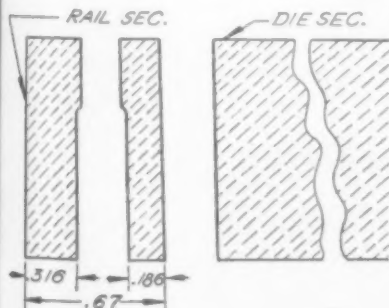
Absolute coordination of holes in all parts, both horizontally and symmetrically, was necessitated to facilitate assembly. Symmetrical coordination was of particular importance in that the walkway called for an upper and lower angle reinforcement on each side of the assembly. By piercing the upper right side angle on the lower left, and the upper left angle on the lower right side of the die, an extra stripper plate was avoided.

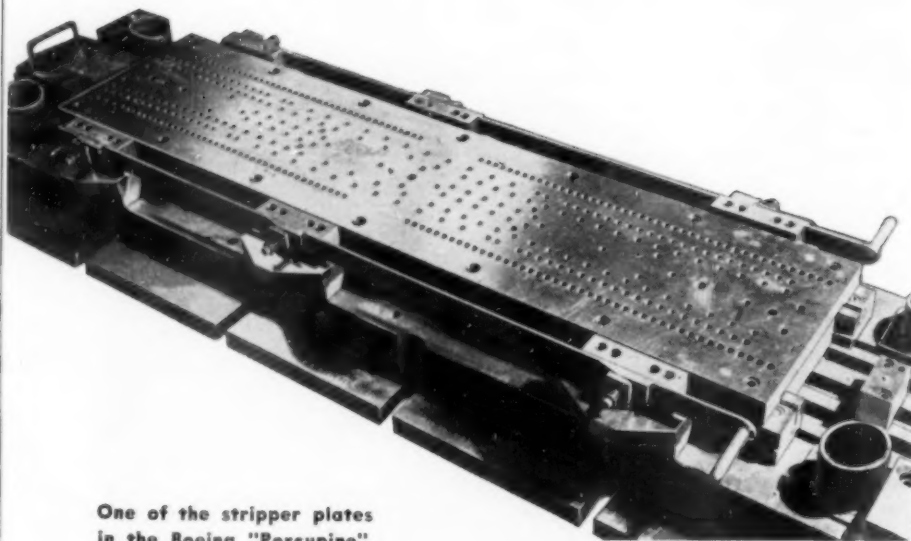
Stock pushers incorporated in the die design include four different adjustment operations, one for each different press operation. This type of adjustment aids substantially in making the die sufficiently flexible to handle the variety of parts. The operation and setting of the stock pushers is thoroughly explained to the press operator through a production illustration dealing with the operation of the die, and turned over to the manufacturing shop simultaneously with the die.

Close coordination of holes called for a high degree of accuracy in die design, as well as fabrication. The original design was projected in true

Die rail section.

Stock is held by a small amount of material. The .167" hole shown is part of row, with .5" between centerlines.





One of the stripper plates in the Boeing "Porcupine".

This die punches an intricate hole pattern in making Fortress parts. Guide pins are located in punch to facilitate sharpening of the die.

perspective scale by production illustration, whereby mistakes in design and other flaws were caught on paper rather than in metal. Construction accuracy was maintained by drilling all critical tooling and punch location holes on a jig borer.

To facilitate maintenance, the punches were mounted in two punch retainer plates. This simplifies grinding or replacement of punches. Similarly, the guide pins were located on the punch rather than the die, to make possible the precision grinding of the die plate without necessitating the removal of the guide pins.

COMPROMISE IN DESIGN

Another problem involved in the die design was the wide variety of stock gauges specified by the re-design of the walkway. To provide the proper punch clearance, minimizing the possibility of flaring while punching and at the same time still producing a clean stripping action, the diameter clearance between the punch and die was compromised, leaning slightly in favor of the heavier gauges. With D the punch diameter, and D_1 the die diameter, the original problem was one of endeavoring to balance the two unequal equations: $(D + .005 = D_1) = (D + .015 = D_1)$

That the final result was a satisfactory compromise is proved by the fact that cross-sectional photos of rivets driven through the series of

holes show no unfilled sections, and that no punches have been broken because of improper stripping. In fact, replacement for any reason is low. Stripping action is aided by maintaining the punch diameter slightly larger than the shank.

Because the presses in the Boeing plant of sufficient size to accommodate this large piercing die are of the solid bed variety, five slug relief channels had to be provided under the die. This further complicated the problem of providing a sufficient amount of material in the die plate between the outer and secondary rows of holes, on either side, and still providing the proper clearance for the installation of the angle stock, which was to be pierced by the secondary row of punches. Working to close tolerances and proper pre-positioning of stock, precision workmanship met the requirement at those critical points, where .167" holes are .5" apart, on centerline, leaving a relatively small amount of material in the die "rail"

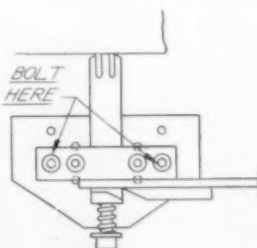
section. From the outer extremities of the rail to the cutout for holding angle stock there is but .67" of material. From this extremity to the edge of the die hole, the material is .316", while from the angle cutout to the opposite edge of the hole, the thickness is .186".

Indexing of the different parts is accomplished by a variety of methods. The secondary web and the reinforcement angles are controlled by the shuttle stock ejector. This permits positive indexing, as well as a rapid means of ejecting parts from the die. The "T" sections are indexed against a stock stop block installed during the changing of the stripper plate which is used for this piercing operation. The primary web is located in the die by an indexing hole. The reason for not indexing this part is that stock is removed on a router, which does not make a sufficiently accurate cut for indexing purposes.

ELIMINATES COSTLY TOOLS

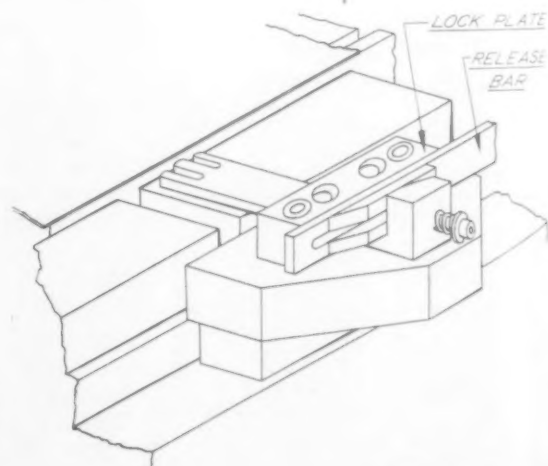
No master gage or template was used in making the die. The base of all holes location is a dimensional layout on which each hole is accurately located in respect to X and Y axes. Being a portion of the die design, this layout permits the reproduction of any part of the die by drilling all holes on a jig borer, properly positioned in respect to the X and Y axes. Thus costly master tools were eliminated. The inspection of production parts was also simplified by the die. The aircraft inspector checks the die when it is set in a press, to make certain that it has not been damaged, and that the die bears the stamp of a Boeing tool inspector, signifying that the punches are sharp and properly positioned.

THE END.

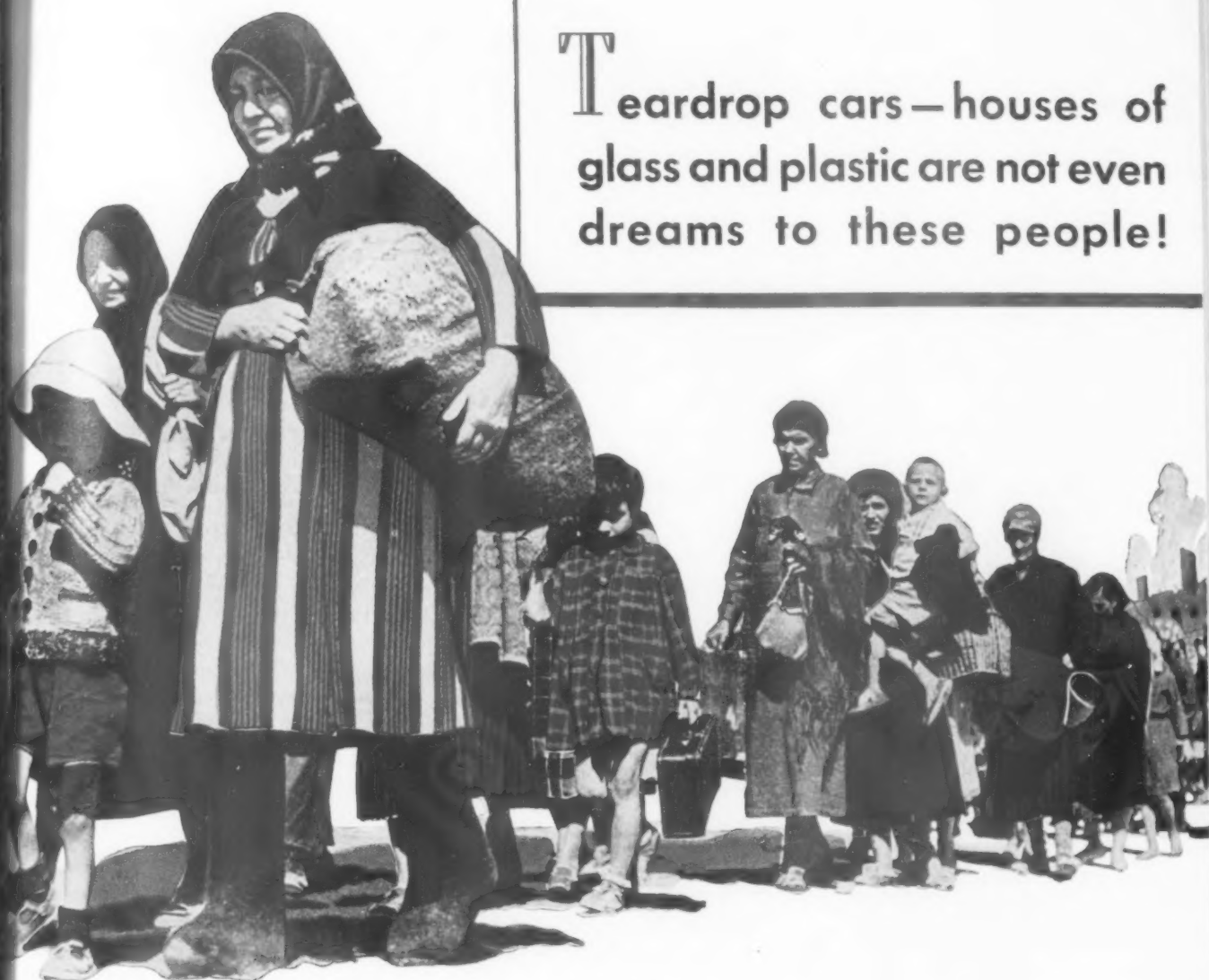


Stock pushers are adjustable to meet requirements of a variety of parts.

Drawings indicate the ease of operation. The schematic drawing at right shows pusher released. Detail view shows pusher locked for use. All pushers on one side of die are released by sliding release bar. Bolts in lock plates hold pusher in position.



Teardrop cars—houses of glass and plastic are not even dreams to these people!



COURTESY NATIONAL WAR FUND



**IT IS PATRIOTIC TO PLAN NOW
FOR THE POSTWAR ERA**

Warner & Swasey offers you practical help on postwar planning. We have a corps of engineers who are skilled in *all* machine operations involved in production of precision parts made of metal. They are helping many war plants improve methods and machines for greater production. They will continue to do so, but their services are also available to management interested in planning *now* for the future. Write

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Turret Lathes
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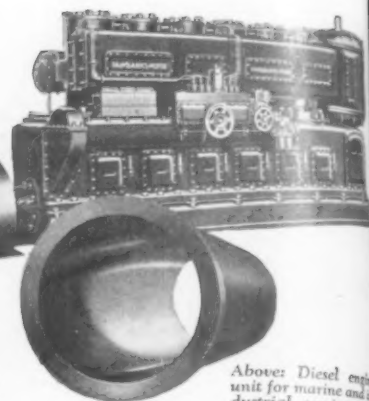
AMERICA'S postwar prosperity with employment and earnings of all who want to work, will not come from grandiose schemes of a helicopter in every back yard and every citizen happy in an ultra-modern metal and plastic home magically erected over night.

Those things may someday come true, but the *immediate* job for a postwar America will be producing to provide for the grim realities that will be faced by millions of peoples in devastated countries; it will be producing staple materials and consumer goods that folks in our own land have done so long without.

Of course, industry shall take every advantage of new materials, new techniques and processes. Up-to-date machines will be needed, too.

Surprisingly, thousands of plants in this war period *have not modernized* their metal turning departments. A lot of war production is coming off machines that were old at the start of the war. Much machinery is wearing out under constant, non-stop usage. Thousands of plants which reconvert from war work, will find their present production line machinery worn out, obsolete or inadequate.

It is estimated that major industries in the United States after the war plan to spend in excess of 2¼ billion dollars for reconversion and modernization. Start planning now—don't be handicapped in postwar competition by "too little and too late".



Above: Diesel engine unit for marine and industrial service. Also honed 17 1/2" diameter Diesel engine sleeve.

...to give better performance in

Diesel Engines for Marine Craft

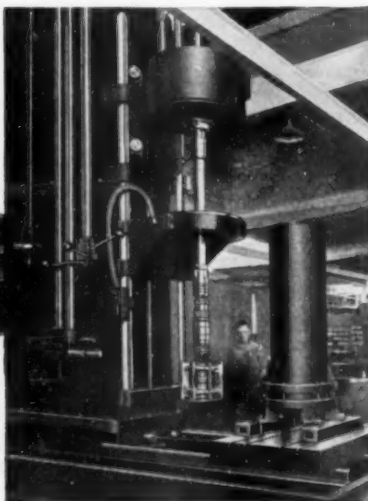
Diesel engine sleeves and cylinder surfaces are finished with precision accuracy to final size within .0005" to .001" by **BARNESDRILL** Honers. Defects from all previous operations, such as tool marks, hills, chatter and surface irregularities are removed. A smooth circularity of the finished cylinder down to the base metal makes complete contact of the piston rings with uniform and permanent radial pressure which results in full rated horsepower and maximum economy in fuel and oil consumption. **BARNESDRILL** Honers are also used for honing crank pin, knuckle pin, and wrist pin holes in aircraft connecting rods, superchargers, bearings, bushings, valves, landing gears, brake cylinders and similar parts.

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BARNESDRILL builds a complete line of Hydraulic Operated, Internal and External Honing Machines in Vertical, Horizontal and Combination Types. Internal honed diameters range up to 42 inches, lengths up to 75 feet and longer if required. External surfaces are finished with excellent results by conventional or co-directional honing. In addition, **BARNESDRILL** makes a complete line of Drilling Machines used in the production of engine cylinders, connecting rods, crankcases, valve guide bushings and other automotive parts.

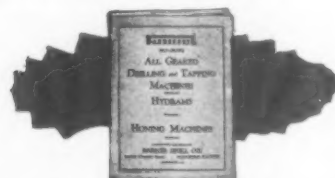


Above: No. 4030 Large **BARNESDRILL** Vertical Honing Machine working on a Diesel sleeve which has 17 1/2" bore and is 5 feet long. This machine also handles cylinders up to 30" diameter and within 90" stroke.



BARNESDRILL ENGINEERS

will help you select the proper honer for your specific production requirements. Send blueprints of parts for analysis and recommendations without obligation.



FREE DATA:

Bulletin No. T-151, on Honing, Drilling, Boring, Reaming, and Tapping Operations—and the complete line of **BARNESDRILL** Equipment.

Left: Close-up view shows machine with the hydraulically-operated work table in the loading position.

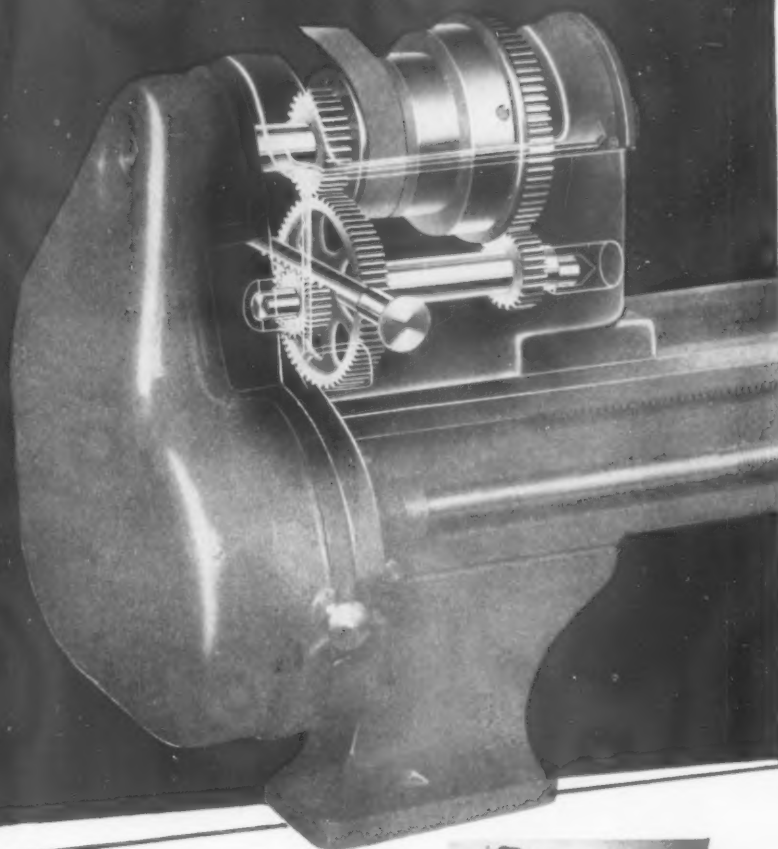
Barnes Drill Co. 848-71 CHESTNUT STREET
ROCKFORD ILLINOIS, U.S.A.

BACK GEARS ENCLOSED IN HEADSTOCK

With Patented
Shifter Rack

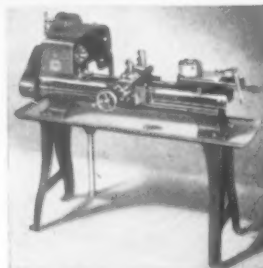


Finger Tip Control for
Easier, Faster Back
Gear Shifting



The advanced back gear design permits placing the patented back gear shifter rack where it belongs . . . at the operator's finger tips. No longer is it necessary to reach over the headstock to operate the lever which shifts power to back gears. Not only is the position of the back gear shifter rack safer and more convenient, but it also saves valuable seconds every time the shift is made. Finger tip accessibility of the back gear shifter rack is just one of many reasons why you find Logan Lathes in shops with outstanding production and safety records. Note the wide and durable semi-steel back gears. Write today for information on all models of Logan Lathes.

Brief Specifications: Swing over bed, 10½" • Between centers, 24" • Bed length, 43¼" • Spindle hole, 25/32" • Precision ground ways; 2 prismatic V-ways; 2 flat ways • 12 spindle speeds, 30 to 1450 r.p.m. • Protected by ball-bearings or self-lubricating bronze bearings.



No. 850 Manufacturing Lathe



No. 200 Back Geared Screw
Cutting Lathe

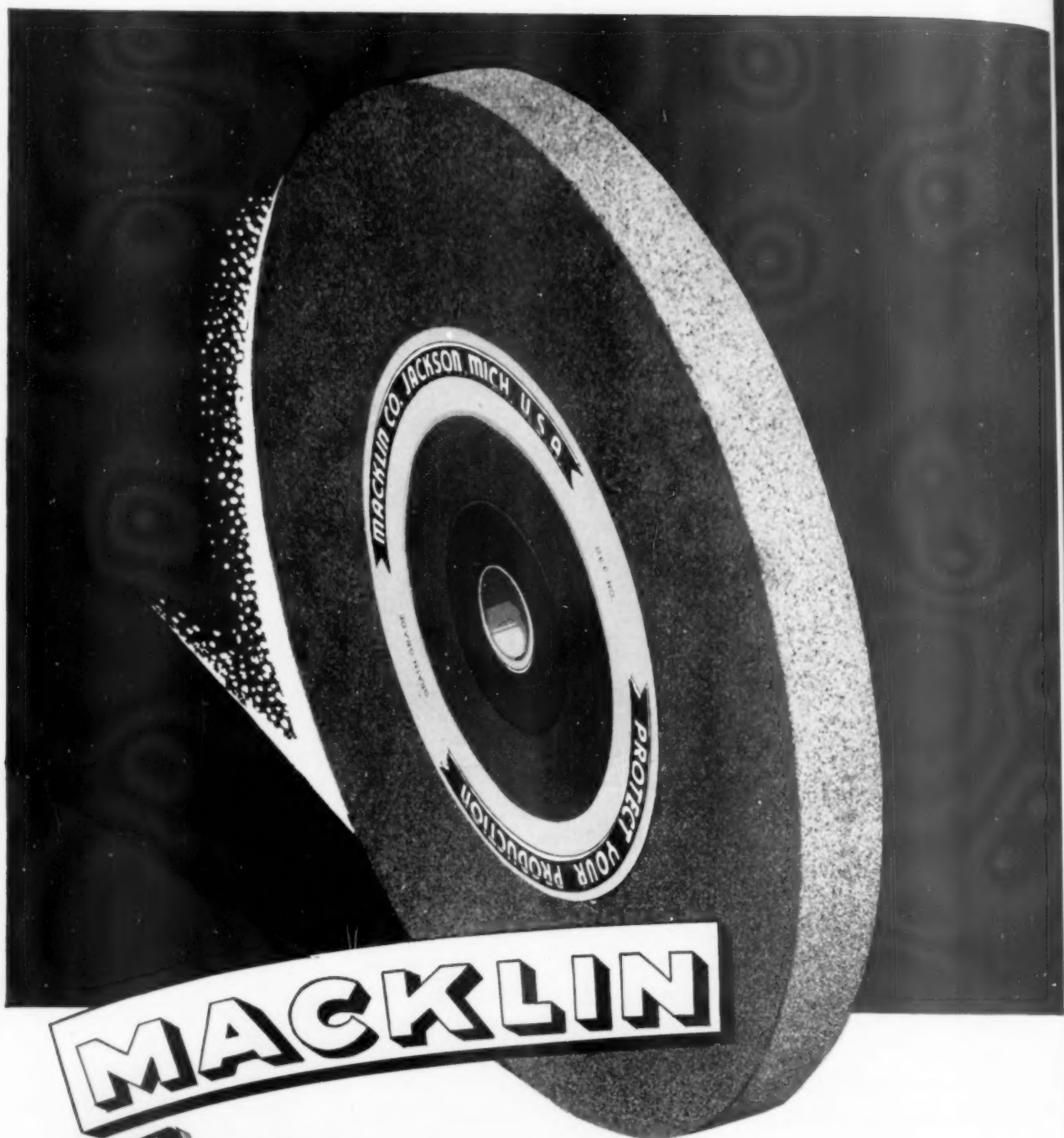


A NAME TO REMEMBER WHEN YOU THINK OF LATHES

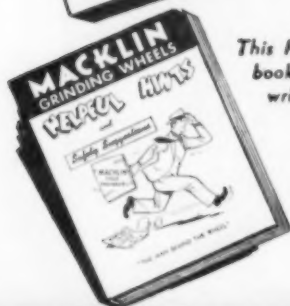
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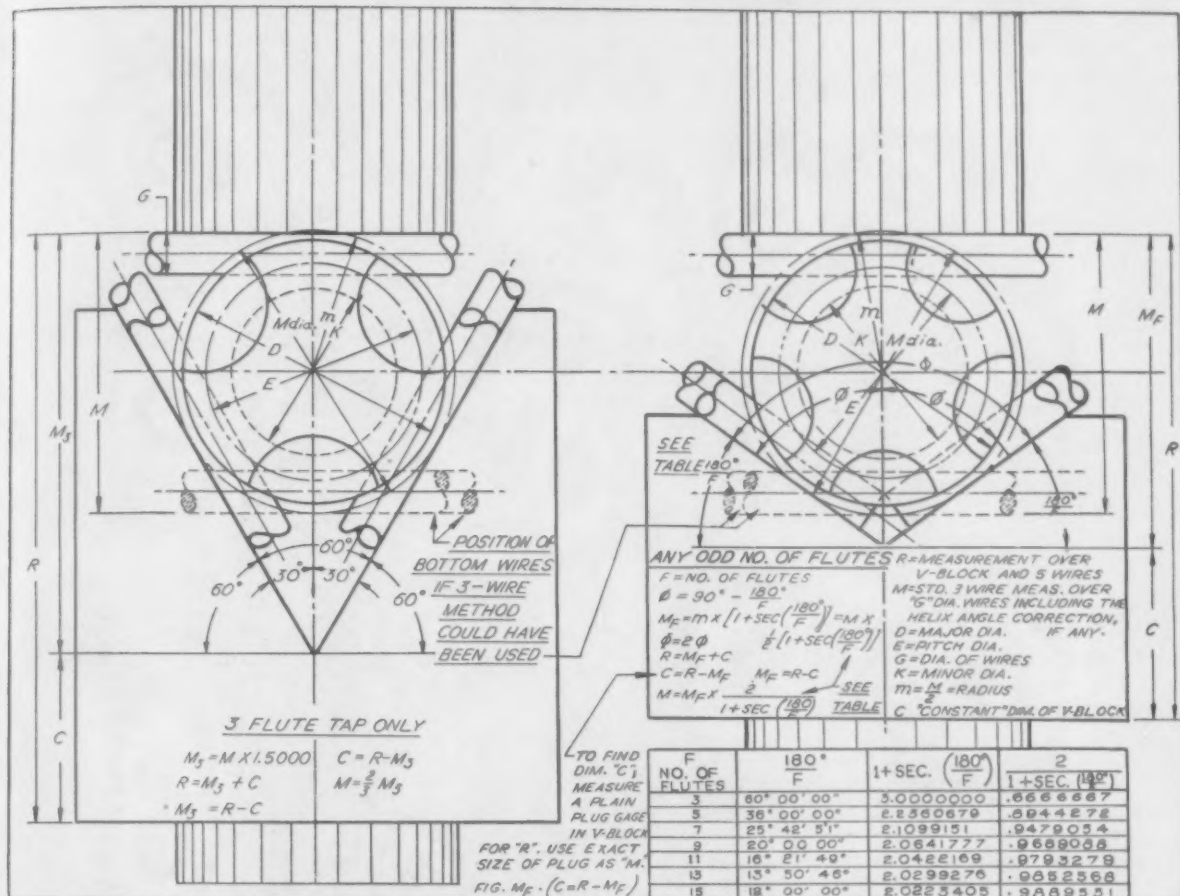
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PRODUCTION DATA SHEET

5-WIRE V-BLOCK MEASUREMENT



Diagrams and formulas to transpose 3-wire thread measurements to 5-wire V-block thread measurements, also for reverse transposition. Used to measure pitch diameters of taps with odd numbers of flutes. These formulas use, as a base, the 3-wire thread measurement "M", including the helix angle correction, if any, and are applicable to all thread forms without change because "M" includes the thread form formulas. "R" is the dimension obtained by direct measurement.

• Frequently, requests are made for charts which will aid tool engineers in measuring the pitch diameters of taps with odd numbers of flutes. When an article appeared in THE TOOL ENGINEER, last October, on "Screw Thread Pitch Diameter Calculations and Measurements," by William T. Taylor, the need for assistance in making direct measurements was emphasized.

Responding to this requirement, Albert A. Herrick, of the Greenfield Tap & Die Corporation's engineering department, prepared the chart shown above. Though the chart is self-explanatory, the following brief description may be helpful.

The 3-wire measurement of the tap is figured in the ordinary manner, and should include any helix angle correction, if the nature of the thread introduces one. These steps of the calculation are not included in the chart, in that they are routine, and are contained in an article by Mr. Taylor (THE TOOL ENGINEER, August, 1943), as well as in many handbooks.

The formula for the helix angle correction, which was

omitted from Mr. Taylor's article, is as follows:

$$\frac{1}{2} \text{ wire diam.} \times (\tan. \text{ helix angle})^2 \times \cosine$$

$$\frac{1}{2} \text{ thd. angle} \times \cotangent \frac{1}{2} \text{ thd. angle}$$

Unless this correction amounts to more than .00015, it is omitted, otherwise it is added to the 3-wire measurement. This is "M" on the chart. "M" may also be the direct measurement over a master plug gage for comparison. This "M" dimension is used as the diameter of a cylinder in contact with the V-block and measuring anvil.

"R" is the direct measurement and is the sum of the distance over the top wire to the point of V, plus the distance from the point of V to the base of the V-block.

The chart also shows the formulas for the correct V-block angles.

Most symbols used agree with those in the National Bureau of Standards Handbook H-28, "Screw Thread Standards for Federal Services." Others were introduced to cover dimensions not shown in this handbook.

NOTE: On this page is the twenty-eighth of a series of Data Sheets to be published in THE TOOL ENGINEER.

A handy three ring binder can be secured at any dime store to hold the sheets for quick reference.

THE TOOL ENGINEER FOR FEBRUARY, 1944

THE CRIB

T. M. REG. U. S. PAT. OFF.

IDEAS • KINKS • SHORT CUTS

Increased Life for Soldering Irons

For hand soldering, an iron has been devised for continuous use. An iron will now last for several months, as compared with a life of 10 days to two weeks.

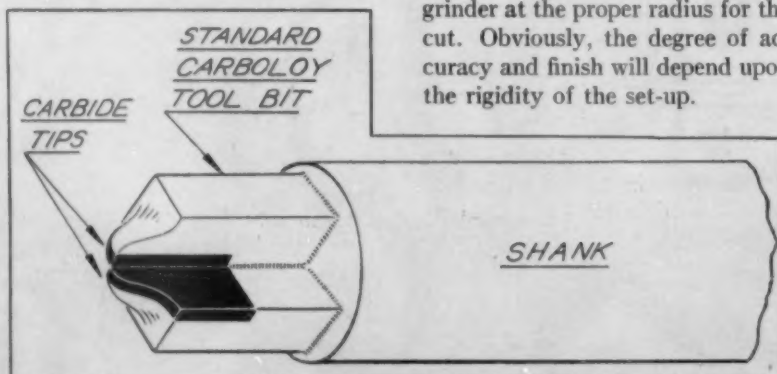
A 1/16" iron shell, conforming to conventional tip design, is filled with copper and brazed. The shell is thin enough to conduct heat, yet it protects copper against oxidizing.

How To Do End Milling with Turning Tools

The use of ordinary carbide turning tools for end milling is an interesting shop-kink developed at the General Electric Company's shops in Schenectady. Such cutters are used when production quantities for conventional tools are limited, or when time required to obtain special cutters would delay the job.

To produce such an end mill, two standard Carboloy cemented carbide tipped tools are welded together, as shown in the sketch, so that the tips form the cutting edges of a two-tipped cutter. The assembly is in turn welded to a shank suitable for mounting in a milling machine.

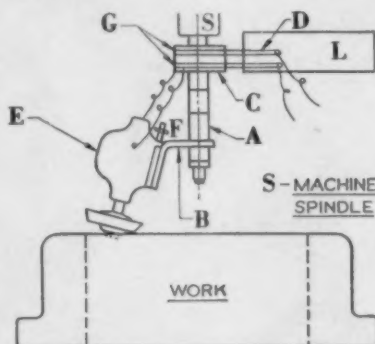
The cutter is then ground to size and form, with the necessary backing off clearance, etc., according to the metal to be machined. Such cutters are currently used in machining a wide range of materials, including tool steel and bronzes.



Grinding Hole in Large Casting

The problem of grinding a large hole in a casting too big to swing can sometimes be solved by placing the work on the table of a milling machine and using a small electric grinder.

The grinder is swung in a proper radius by attaching it to the milling machine spindle as shown in the adjacent sketch.

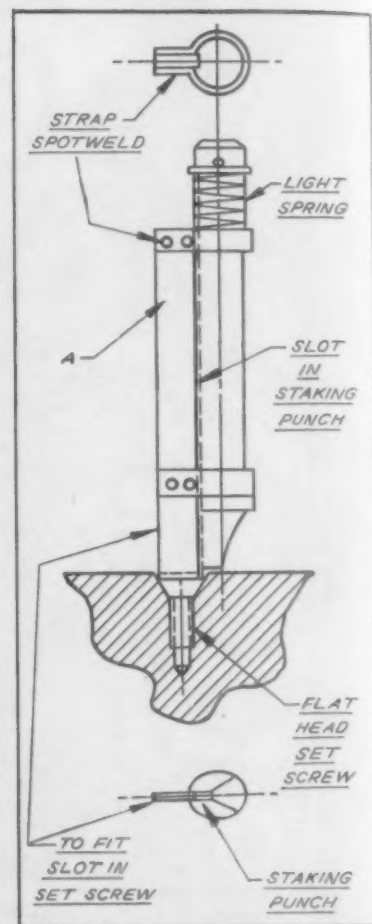


A wooden drum C is mounted on the arbor A. Two metal bands G, to which are attached wires to the motor E, contact flat springs D, which act as brushes, bearing on the bands.

The brushes are fastened to a board which is clamped to the over-arm of the milling machine. Wires L, plugged to a light socket, are connected to D to supply current to the motor.

The motor and grinder unit revolves with the arbor by means of the flat bar B. Adjusting screw F enables the operator to position the grinder at the proper radius for the cut. Obviously, the degree of accuracy and finish will depend upon the rigidity of the set-up.

Staking Slots in Flat Head Screws



The tool shown in the accompanying sketch is useful for staking the slots of flat head screws to prevent their turning.

The blade A, made from this stock, is slotted into the staking punch. Straps, spot welded to A, hold A under spring tension, keeping it in the slot and in relation to the staking punch, as shown.

• Have you ever made notes on some of your "know-how" items—or perhaps drawn sketches on a paper napkin—only to throw or give them away?

When you have an idea, short cut or kink, send it to THE TOOL ENGINEER. You will receive five dollars for each one of yours that is published. This is something to do while waiting for the soup to come, and it more than pays for the meal.

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MEN • MATERIALS • MACHINES

LOST TIME Means Lost Production



NUMEROUS eye injuries were caused by drill presses in the Tool and Die Department, the point of operation being approximately the same level as the operator's eyes. To overcome this condition, benches on which presses were mounted were lowered 8" to 10". Lowering the level of operation not only decreased hazards to eyes, but afforded operators a better view of the operation. Operators wear safety glasses.

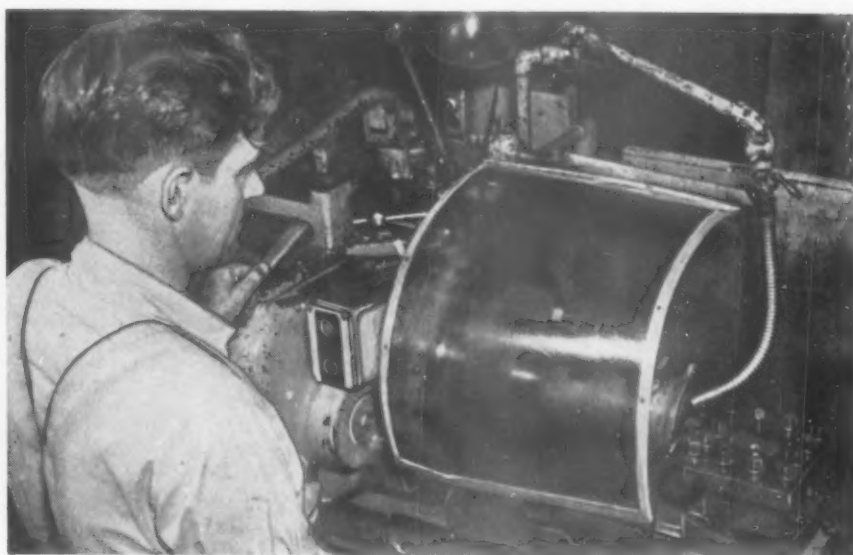
WALLACE SCOTTEN

ASSOCIATE EDITOR

ANY substantial reduction in lost worker-time means a corresponding increase in production. Consequently, industrial management cannot overlook the fact that accidents still rank with illness and absenteeism as prime robbers of time on the job.

Nearly every production industry today has an established safety program, and most of them have a safety department devoting full time to the problem of eliminating accident hazards. Nonetheless, the overall rate of industrial accidents in American war industries remains abnormally high and the death rate resulting from such injuries is shocking.

Joseph D. Keenen, War Production Board vice chairman in charge of labor production recently reduced the maze of facts and figures on shop



HI-CYCLE MILL covered with special guard which extends from below the machine bed level to a safe distance above the point of operation. Plexiglass shield in this guard at the Nashville Division of Consolidated Vultee permits the operator to stand behind the guard and observe operations. Guard is mounted on wheels so it may be removed between set-ups. Other protecting walls around the machine consist of two layers of plywood separated by sheet iron.



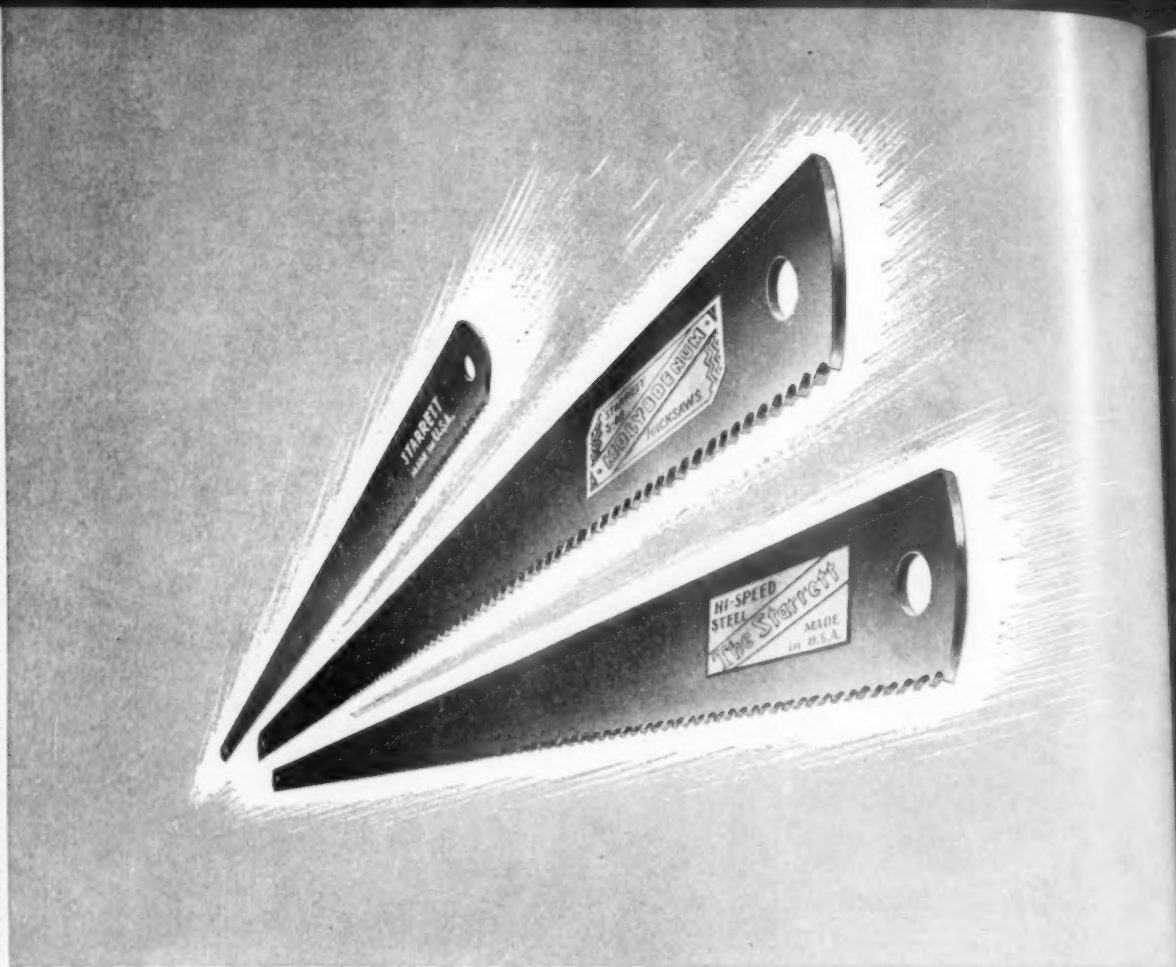
Consolidated Vultee photos

AUTOMATIC SCREW MACHINE which has been equipped with a plexiglass shield covering the point of operation. The shield eliminates the possibility of eye injury due to flying chips and oil, and permits clear vision of the operation.

accidents to the simple, if startling, observation that, "Each year about a full division of soldiers of production die of accidents at their work... and to a nation at war, the loss of 18,000 workers is a heavy blow."

There is no denying that World War Two is much safer than World

War One for the American worker. Deaths per 100,000 workers in the current war are one to one and one half times less than fatalities to war workers in 1917-18, figures compiled by the National Safety Council indicate. The Council also has pointed out that the increase from 1941 to



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1942 was much less than the rise in deaths from 1917 to 1918.

But the most substantial time loss from shop accidents remains minor injuries resulting in from several hours to several weeks off the job. Production speed-ups, inexperienced workers, and the additional hazards of handling war materials has produced a sharp increase in such accidents among workers.

Figures compiled in Washington show that since January 1943, between 60,000 and 65,000 workers have been injured each month in mass production industry, with an estimated loss of 20 days per worker.

TIME LOSS SKYROCKETS

Direct losses for one month last year ran as high as 1,300,000 man-days. This does not take into account the workers permanently injured during the period, which would multiply the loss in production between four and five times. In the last year before the United States entered the war, 453,000 workers suffered disabling injuries. In 1942—a war year—this figure reached 720,000, and is mounting rapidly.

One conclusion is obvious. Every man interested in getting production out might well devote more thought to accident prevention.

To learn some of the most effective methods of reducing the accident rate in metal working industry, THE TOOL ENGINEER studied aircraft production safety practices. Manufacturers of military aircraft have been especially successful in protecting the safety of their workers. Of 31 war industries studied, the aircraft manufacturing industry was among the top five in low accident severity and among the top six in low accident frequency.

FAVORABLE AIRCRAFT SHOWING

Workers in aircraft manufacturing suffered only 9.53 disabling injuries per 1,000,000 man-hours worked, as compared with an average of 14.85 for a total of 31 industries, the National Safety Council has told us. The severity of accidents in aircraft plants was .61 days lost per 1,000 man-hours, compared with an average of 1.49 for all 31 industries.

Outstanding among the safety records established by aircraft industries during the past year is that set by the Nashville Division of the Consolidated Vultee Aircraft Corporation.



Last year 18,000 American mass manufacturing workers were killed in the shop.

Every month more than 60,000 workers lost an average of 20 days from their jobs because of injuries

Here is proof that shop safety can boost your production

A BURRING MACHINE in the Consolidated Vultee Cable and Conduit Department equipped with a plexiglass guard over the drive belt. This shield affords protection when the belt breaks, prevents the employee from reaching into the moving parts of the machine, and provides clear vision of the working machine parts.

With due emphasis being placed on shop safety devices, a review of the safety program at Consolidated Vultee's plant in Tennessee should convince the most skeptical that the records being set there are more than luck.

The records being shattered at the plant speak for themselves. During the first five months of 1943, the plant had an average of 1.7 lost-time injuries per million man-hours worked. The average during the first three months—the only accurate figures available—for twelve leading aircraft manufacturers in the country was 16.1 lost-time injuries per million man-hours.

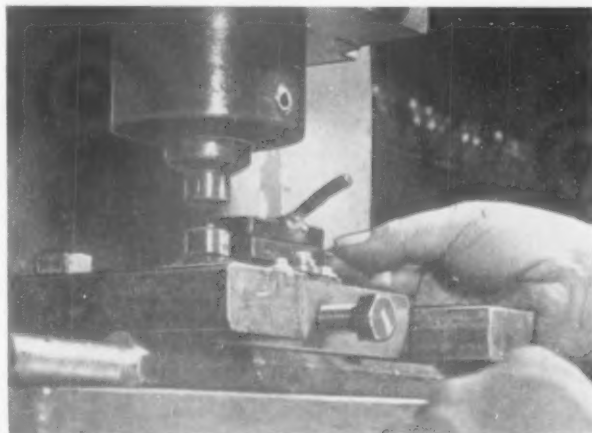
Recently the Nashville plant set what is believed to be an all-time record for the plane builders in working

2,337,980.4 man-hours without a lost-time injury. This record was broken when a worker suffered a compound fracture of the thumb while working on a high-cycle shaper.

The nine-man safety department, under James Figue, director, is in charge of all safety engineering, investigation and worker education. A full-time optician, a member of the department, handles both industrial and personal eye cases for the employees.

Under the supervision of the director, who, incidentally, is only 23 years old and probably is one of the youngest safety directors in industry today, all shop practices are constantly checked for hazards. From this constant surveillance has resulted a number of machine safety devices,

SWAGING machine in the Cable Department equipped with a cable holder into which cable is inserted prior to operation of the machine. Previously, operator's hands were adjacent to the point of operation.



some of which are shown in the photos illustrating this story. These were all originated in the plant itself, either by members of the safety department, or from ideas submitted by interested employees in whom safety is inculcated continuously from their first day on the job.

COUNSEL FOR "GREENIES"

Safety is taught new employees from the very beginning of work training. The importance of safety precautions is stressed in a talk given to the new worker even before he starts on his job.

Emphasis, too, is placed on the value of the right kind of safety equipment for each job.

- "Wear your hair net... wear it properly..."
- "Wear your goggles..."
- "Wear your safety shoes."

These thoughts are impressed on each worker, and close, continual check is made to see that every rule is enforced.

Sixteen kinds of safety goggles, to fit any need, are available to workers at no cost and are selected for the job and fitted to individual employees by an optician and equipment engineer. The Nashville division was reportedly one of the first aircraft plants in the country to have a train-

ed optician available for this service to workers. Since this service was inaugurated, eye injuries, usually the most prevalent in plants of this type, have been reduced from 35 per cent of all injuries to 8 per cent. Research is made on all types of safety equipment, and findings of the department determine whether the product is used in the plant.

BASIS OF RECOGNITION

Safety performance at the plant is governed not by competition between departments, but is based on improvement in the department itself. In other words, the better a department gets, the harder it is to win recognition. This is done on a point basis. The department having the best score on a monthly inspection wins a gold trophy for display during the ensuing 30-day period. Gold shields are then engraved and the department keeps the shield on display indefinitely as the cup passes on to a new winner. The department with the worst improvement score for the month from a general safety viewpoint has to keep a large white elephant, made of clay, in full view for 30 days.

Recognizing that safety and cleanliness go hand in hand, an extensive housekeeping program, under the di-

rection of a safety engineer, is designed to keep accident hazards and untidiness at a minimum. The department getting the lowest score in this respect wins possession of "Boris" a life sized figure of a tramp, for the next thirty days.

DANGER IN THEIR HAIR

Strange as it may seem, Pigue says, one of the toughest jobs faced by his safety department is teaching women workers to wear their hair nets properly. There seems to be an innate feeling among women workers that a pretty curl should be sticking out. During a 10-month period, there were 10 partial scalpings at the Nashville plant, 5 of them due to improper wearing of hair nets and all of which could have been prevented by adherence to safety rules.

Safety education at Consolidated Vultee is stressed by bulletin boards, motion pictures, and lectures. Even though a hazard or bad safety practice among the workers is checked, education of its danger continues. Proof of the value of this particular program lies not alone in the fact that it has permitted the establishment of a remarkably low accident rate, but the recognition it has won from safety experts. "It is a model program for industry", they say. THE END

PRESS SAFETY PLATFORM



A PLATFORM, designed to speed production by preventing accidents, has been put in operation by safety engineers of Consolidated Vultee Aircraft Corporation, San Diego.

It is currently used on Hamilton hydraulic presses which die-form parts for B-24 bombers and PBV-5A amphibians. Its purpose is to prevent body injuries by causing the machine to become inoperative while workers are inserting dies or removing parts.

The platform is built in two sections, one on each side of the press, and is linked to the hydraulic system to control its operation. The weight of one person on either side of the platform causes the press to cease functioning. Thus it is impossible for a worker to get near the machine without stepping on the platform.

—ANDREW R. BOONE

THE TOOL ENGINEER

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Bulletin GT-174 DECEMBER 27, 1943

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FEBRUARY, 1944

103

Tool Engineers Plan Philadelphia Meeting

- Society officials announce plans for twelfth annual meeting. "V-Day Tooling" is emphasized in two-day technical sessions, March 27, 28. Broadening interests of Tool Engineers is reflected in study of complete product tooling.

GATHERING at an annual meeting for the third time since they turned their engineering and productive genius to the task of arming the nation for war, members of the American Society of Tool Engineers will hold their 1944 conclave in Philadelphia, March 26-28 inclusive.

Packed into the two final days of the meeting, Society executives have announced, will be five technical sessions on new manufacturing techniques and production methods calculated to expedite war production. The first day of the meeting, Sunday, March 26, will be devoted to society business, including the annual meeting of the Board of Directors and election of national officers. The annual banquet will be held on the last evening of the meeting, March 28.

NO PHILADELPHIA SHOW

Plans for the business meeting and technical program have been completed and final arrangements for an exceptionally large attendance will be completed shortly, Ray H. Morris, president of the Society has announced. In discussing the meeting, Morris pointed out that in view of the fact that the Society will not hold a machine and

tool exhibition in conjunction with this meeting unusual effort has been devoted to the technical sessions. These sessions, he said, should equal or surpass interest created by any presented in the 12-year history of the Society.

According to Society officers, it is unlikely that the Tool Engineers will hold any show prior to the termination of European hostilities. "Plans are being projected", they revealed, "for holding the largest exhibition in history of production equipment, tools and machines approximately 90 days after the end of the war in Europe."

CURRENT PRODUCTION PROBLEMS

Headquarters of the Philadelphia meeting and scene of the technical sessions will be the Bellevue Stratford Hotel. Arrangements have been made for ample accommodations in other nearby hotels, Adrian Potter, executive secretary stated. Condensation of the technical sessions into only two days is in line with present conditions requiring the maximum possible conservation of time on the part of production men while still securing the maximum interchange of information possible on current production problems, Potter said.

The technical sessions, which will be held during the morning, afternoon and evening, of March 27, and during the morning and afternoon of the following day, have a "V-Day Tooling" theme. Subjects to be covered by 18 speakers at these symposiums, it was explained, are of major importance in cutting production time and costs while increasing finished-product quality of war work. At the same time, these techniques should prove equally important when civilian production is resumed according to Douglas D. Burnside, 1st vice president, who is in charge of the Philadelphia program.

SESSION SUBJECTS REVEALED

One of the outstanding sessions, it is expected, will be that on "Production, Tooling and Personnel". The speakers panel for this session will include several men outstanding in production management today. "Variable Machining Controls" is the subject of another session in which existing and possible uses of the newer automatic controls for machine tools will be discussed.

General machining subjects, including new rapid metal cutting techniques, dry fly cutting and internal and external broaching, will be discussed in the fourth session.

The broadening interest of the Tool Engineers is reflected in the subject of the final technical session. In this, product tooling from the drafting board through final inspection will be discussed by men well-known in mass production industry.

One World, One Unit of Measurement

Cost remains the chief deterrent to American adoption of the metric system. Reconversion may provide an opportunity to make the change

FEW ISSUES have been as hotly debated, pro and con, as the oft-times advanced proposal that American industry adopt the metric system of measurement. Controversial though it may have been, the logic of the system was seldom denied, rather, the opposition was based on costs. It would be too expensive, it was claimed, to convert from the established and involved American system.

Yet, over a period of decades, American industry has spent severalfold, in endless computation and in mathematical errors, over and beyond what conversion would have cost in the first place. And, the advantages of the metric system were tacitly acknowledged when, with its introduction, the micrometer caliper—and the vernier as well—was graduated in decimals.

Then, for convenience, time study was predicated on the decimal system. We now determine time-cost in hundredths of a minute, hundredths of an hour. And, latterly, a nationally known clock maker suggests a 20 hour clock as

A. E. RYLANDER
TECHNICAL EDITOR

a timepiece for the post-war era.

When America became anti-friction conscious, precision ball bearings were gladly adopted despite the fact that bore, O.D. and widths were to metric scale. They still are, except for a few specials. And when, soon after the turn of the century, the American Locomotive Works started to build the Berliet automobile (it became known as the Alco) they furnished metric mikes and scales to their workers and started production. Just like that!

But, when an American manufacturer set up, early in this war, to make the British Rolls-Royce engine, the lesson of Alco's "conversion" was entirely forgotten. Instead, to comply with specifications that all parts had to be interchangeable with the British original, all metric dimensions were converted to inches and fractions thereof.

This job involved painstaking and

delicate—and, needless to say—expensive engineering, in addition to the delays incidental to conversion. The opinion has been advanced that it might have been far easier, and much less costly, to have retained the original metric dimensions and simply trained the workers—(many of whom had never seen a mike, anyway)—to read metric micrometers.

Now, the foregoing is not intended to add fuel to the fires of controversy, but to provoke thought. However, we will eventually face a reconversion to peacetime manufacture as revolutionary as the conversion of American industry to war production. Countless millions of dollars worth of special tools, gages and even machines will become so many white elephants. And, perhaps, that would be a good time to go all the way and adopt the metric system.

One world, and one unit of measurement universal throughout the world! We could bridge the transition with Johansson's famous 25.4.

THE END

THE TOOL ENGINEER

HOW DOES THE GAGEMAKER

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HE MAKES ?



Plug gages being checked to a tolerance of a few millionths of an inch at Republic Gage Company, Detroit.

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sibility of integrity so imposed is appreciated by Sheffield and respectfully observed by the master craftsmen who make the instruments by which other types of gages are checked.

DELIVERY WITHIN TWO WEEKS can be made of your Visual Gage requirements for production and gage inspection. Six amplifications, 500, 1000, 2000, 5000, 10,000 and 20,000 to one. Wire or write for quotation.



THE SHEFFIELD CORPORATION

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MACHINE TOOLS • GAGES • DIMENSIONAL CONTROL • CONTRACT SERVICES



CAPITAL COMMUNIQUE

T.M. REG. U.S. PAT. OFF.

T. N. SANDIFER

Special dispatch from THE TOOL ENGINEER'S Correspondent in the nation's capital.

WASHINGTON
RECOMMENDATIONS of machine tool manufacturers, mass production executives, and others who have been in Washington in recent months to point out equipment needs in any immediate post-war situation, appear likely to get real consideration.

This may look like an optimistic statement to those who have spent much time in Washington, but it is this department's opinion that the above-mentioned group have made a good impression generally, and left with the various Congressional committees to whom they have spoken a real appreciation of the fact that machinery is the key-stone to conversion.

REPLACE WAR-LOANED MACHINES

C. E. Wilson, president of General Motors Corporation, when appearing before the Truman Committee, pointed out that in the case of his own company some 3500 machines had been released to other producers—some to subcontractors who lacked a particular machine to complete their part of the job in hand, some to Lend-Lease even, and that in this number were what he would call "bottle-neck" machines.

"In the modern mass production—progressive manufacture—you have to balance capacity by operations, and some of these missing machines would be bottle-neck machines—in other words, without getting them back, or their equivalent, we couldn't produce anything," he explained.

He was making the point that not only do mass production plants face the conversion or post-war problem of unscrambling government owned facilities and equipment from that privately-owned, but also the need to replace machines loaned from the production line for war purposes.

He expressed the view that with conditions in machine tool plants as they are, it should be possible for big producing units to begin before long to replace such equipment in order to facilitate a return to normal operations without too great loss of time and employment for returning servicemen.

DEMobilIZATION OF INDUSTRY

Since Wilson and others have appeared here, a number of measures have been drafted by members of Congress, or by various committees, Counsel for the George committee (Senator George, Dem., of Ga., chairman) on post-war problems, has prepared for committee consideration a report of the several recommendations that have evolved. While the report has not been made public it is known that it recognizes the views of those like Wilson, who have supplied a practical approach to the whole problem of post-war.

This committee has under consideration legislation which would establish an over-all coordinating group to handle demobilization of industry, very much as the Byrnes organization is charged with war mobilization. One of its salient functions would be to have ready plans to make such machine tools and equipment available immediately when industry needs them. Another would be to deal promptly with the need of clearing production floors of unnecessary Government machinery and inventories, to make way for new work.

Just at this point, all such plans have a big question mark behind them. Nobody knows what to expect from the projected attempt to land an army in continental Europe. There always is the possibility that vital equipment will be lost, and have to be replaced on a large scale. Production plans all along the line are geared to that contingency, however remote it might actually be.

The Labor Department reminds that the other side of this picture is that World War One ended so suddenly that we were caught flat-footed. Nobody was prepared for the end, any more than we had been for the beginning. What members of Congress, and various agencies here are trying now to do, is avoid a repetition of that situation.

SURPLUS MACHINE TOOLS

Legislators facing the inevitability of the post-war era nevertheless, must plan now. Besides the projected legislation already mentioned, two other bills before Congress are pertinent. One, by Representative Manasco, Dem., Alabama, is a House version of the bill introduced in the Senate by Senator Murray, Dem., of Montana, providing for utilization of surplus machine tools.

Senator Murray is the outstanding exponent of "small business" aid in the Senate, it will be recalled. It is not surprising to find that his bill, the "Surplus Machine Tool Utilization Act" has, as its nugget idea, a proposal to make some 300,000 machine tools available to "small metal-working concerns generally, and in particular to aid in setting

up war veterans in metal-working enterprises." Government loans and advances are provided for such purposes.

The number of tools cited is the Senator's estimate of those that will be surplus, or are even now lying idle, or would be in the way in private plants of large size. He reported that from 1941 to 1943, inclusive, not less than 700,000 machine tools were produced in this country, in dollar terms exceeding the total output of 20 years pre-Pearl Harbor years.

These surplus tools would also be available for other stated purposes besides aiding small shop operators to get heavy equipment. The bill, like the others described, is still in the mill.

This is probably a pertinent place to point out that the efforts around Washington generally, to aid smaller business concerns have not been uniformly successful, to judge by comments heard in the Capital. Statistically, the latest report of the Smaller War Plants Corporation gives a good picture—loans, leases, purchases and sales aggregating in excess of \$50,000,000 to aid smaller plants to get in the war program. Of the total, 65 per cent was in leases or loans of \$25,000 or under. The Corporation, around the year-end, had certified 2260 manufacturers as qualified to participate in the increased civilian production planned for 1944, including five tool-making concerns.

TRANSFUSION FOR SWPC

A typical comment on the SWPC however, is that it hasn't been either as aggressive or as alert, as it might have been. It was set up with a fairly free hand to accomplish its job, given a revolving fund of \$100,000,000 with the implication that it would be expected to finance some bad risks in accomplishing its mission. Instead, it is blamed for using its money in conservative bank-fashion, thus defeating one of its purposes, which was to help some borderline businesses to get into production, which they would otherwise not be able to get in.

The Corporation also had rather sweeping powers initially, to take prime contracts and give them to the smaller operators, and a common charge here is that the Corporation has been very timid in this, also.

However true this might be, the fact is that SWPC is in a sense being revamped, with Maury Maverick, a former experimentally-minded New Deal enthusiast, named as head.

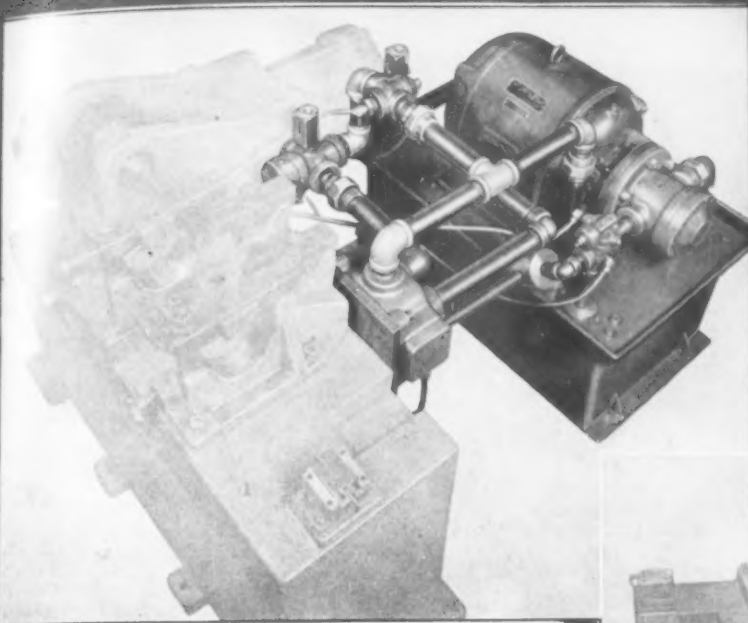
He can be counted on to be aggressive, and to have ideas, whether good, wild, or bad, depends on the viewpoint. He doesn't hesitate to swing his weight around, given the leeway, and the field may be opening for him in this particular period. The War Manpower Com-

(Continued on page 109)

FROM THE WASHINGTON VIEWPOINT

• Washington is giving serious attention to pleas for consideration of post-war machine tool requirements. The not-so-successful Smaller War Plants Corporation gets a transfusion, may play a part in reconversion.



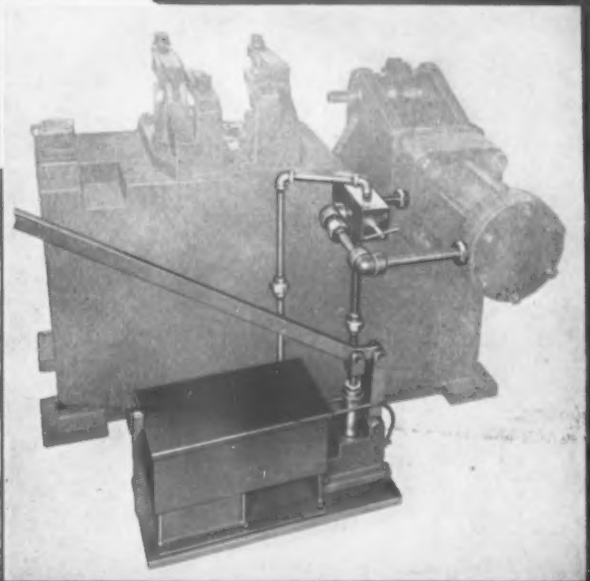


Hydraulic assembly shown is available and adaptable for most tools and tool bits for a wide range of work. It is a simple, compact, efficient, and reliable unit which can be used in a wide range of applications. It is a simple, compact, efficient, and reliable unit which can be used in a wide range of applications. It is a simple, compact, efficient, and reliable unit which can be used in a wide range of applications.

TWO JUMPS AHEAD WITH BETTER TOOLS

We're getting the jump on every fighting front with better weapons. Back of better weapons lies better tools of production of all kinds. Back of better special tools is better special tool designing—for Vulcan it has been a lifetime career nurtured for thirty years and crowned with outstanding achievement in this war.

Fortunately in the midst of war work you can delegate the designing of the special tools for your peace time production. You'll be one jump ahead of peacetime competition because they are better. You'll be two jumps ahead because they are ready.



Ask for the brochure illustrated. It will acquaint you with Vulcan's experience, facilities and service.

The **VULCAN TOOL** *Company*
213 NORTH BECKEL STREET DAYTON, OHIO



THE OLD WAY—Just 40 years ago, the Wright brothers made their first flight. How crude and flimsy was this hand-made plane compared with the aircraft that pour from American plants today.

THE NEW WAY—In 1944, airplane production lines testify to new production speeds, made possible partly by the dependable new accuracies of precision instruments and production tools.

NEW SPEED FROM NEW ACCURACY!

WEAR-TESTED MATERIALS STEP UP TODAY'S PRODUCTION

American war industries quickly found they could obtain new speed from the consistent accuracy of Woodworth precision gages, ground thread taps, form tools and other perishable production tools.

Wear-tested metals give Woodworth accuracy its extra-long life. Every piece of metal used in Woodworth gages is tested for wear by the severest modern methods.

Old in experience and resourcefulness, Wood-

worth has charted new ways to speed war production and to cut inspection costs.

After the war, we shall continue to build to that same accuracy, passing on to Woodworth customers all the benefits of Woodworth production methods and their resultant efficiency, which the new peacetime economy will demand.

Our Engineering and Development Departments are available for consultation on special operating and production problems involving gaging and production tools.

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PRECISION GAGES • GROUND THREAD TAPS • FORM TOOLS • PRECISION MACHINED PARTS • HEAT TREATING • PLATING

—CAPITAL COMMUNIQUE—

(Continued from page 106)

mission now in the situation too, with instructions to its Regional Offices to assist the SWPC in efforts to let sub-contractors small concerns, and also to utilize local labor pools.

Under this broad heading, Senator McCarran of Nevada, is still pushing a campaign to locate heavy industries in new territories with claims of abundant untapped raw materials. This drive originated in Congress among members with states having such claims, and is frankly called an effort to de-centralize heavy industry.

BACKGROUND ON LEND LEASE

While plans are thus being made for various post-war developments, involving in some cases the admitted surplus of machine tools accumulating in this country, the latest Lend-Lease report indicates that other countries have had the benefit of such equipment to a large extent. Incidentally the report revealed that such American items as machine tools have the name of the American manufacturer, and the place of manufacture, cast into the body of the machine tool itself.

This recalls a recommendation of some machine tool men that this fact will make it necessary to oversee very carefully, what tools are exported after the war as surplus, to insure that they are in condition to maintain the prestige of the makers involved.

While the total of machine tool shipments has not been reported, these have gone to Australia, China, Russia, among others. It was recently announced that more than 18,000 metal cutting machine tools had been shipped to Russia alone, up to the end of October. Privately this figure is believed to be much larger, if all machine tools sent to Russia are counted.

LITTLE RECONVERSION EXPECTED

To the extent that all cutting tools may be classed as "expendable" these probably are so classifiable. Generally, those sent to Russia are said to be of light category, and another special feature is that when made for Russian use they were made on metric measurement. This would mean that they could only be utilized for special purposes to the extent that such measures govern production.

Some fears have been heard expressed here recently, that the large stocks of American-made goods abroad will immediately become a menace, once the war terminates active use of them. In other words, it is feared that efforts may be made to unload these goods, which could include the more used-up machinery, on American buyers again at prices that would completely cut the ground from under post-war manufactured articles of corresponding types.

A more confident view is that any machinery so re-shipped would be primarily junk, and would have competition from battle-field scrap on that basis. Where not junk, it would be too valuable where it was.

Meanwhile, the War Production Board takes the position that any 1944 civilian production will be confined to absolute civilian essentials, however promising that metal requirements for many such items may be easier in this year.

THE END



A STEEL KNOT

ACTUAL PHOTOGRAPH

Speed Treat Steel (.45 carbon) 1-inch cold drawn bar tied in a knot, cold, without fracture.

SPEED TREAT STEEL

A MEDIUM HIGH CARBON OPEN HEARTH PRODUCT

ONE STEEL *that gives you*

- 1 Excellent machinability
- 2 Greatly extended tool life
- 3 Good finished parts
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SPEED TREAT STEEL

NEVER BEFORE in the medium carbon field has ONE STEEL offered the above combination of features. Substitute this ONE steel for all medium carbon, carbon steels.

Write us. Our metallurgists are at your service.

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MACHINE TOOLS

... news and trends in the
Machine Tool Industry ...

PRODUCTION TRENDS

- Shipments continue decline;
Backlog is maintained

While the spotlight in the machine tool trade shifted to the problems of completing war contract renegotiation, actual production and shipments continued on their long, long slide down hill.

Final compilation of figures for the month of November by the Tools Division of the War Production Board showed shipments valued at \$71,543,000. The decline from October's \$78,312,000 total was about eight and one half per cent. The preceding month had witnessed a drop of 11 per cent.

When the statisticians on the Potomac had finished their work they announced that total firm orders received in November were valued at \$37,705,000, an increase of eight per cent over the \$34,907,000 October total. Cancellations, their record books showed, were \$5,979,000, compared with the \$4,071,000 in cancellations the preceding month.

Thus, total orders less cancellations stood at \$31,726,000 compared with \$30,800,000 in October. Nonetheless, the industry's backlog continued to skid as a 14.3 per cent decrease shoved the total down to \$245,571,000, compared with a backlog of \$286,600,000 at the end of October.

Final analysis: The industry still has about four and one half months production ahead of it—at the November rate of output.

REPORT ON THE FUTURE

- Big output for 1944; Detroit viewed as best post-war market

CLEVELAND—Though reports are current that virtually all of the builders in at least one major machine tool center have completed their renegotiation, and that a number of them have turned checks over to the government, reliable opinion in machine tool circles indicates that only a small per cent of the industry has gone through the gov-

● For the interest of TOOL ENGINEER readers, who are buyers and users of machine tools, leaders of the machine tool industry have been invited to present their views on possible post-war trends of the industry.

OUR POST-WAR PROGRAM IS UNDER WAY



WENDELL E. WHIPP
PRESIDENT

MONARCH MACHINE TOOL COMPANY

WE have been accustomed over the past two years to measure the contribution of our industry to the war effort in terms of the production of hundreds of machine tools every month.

Now that the country's major war plants have been equipped with most of the machine tools they will need, the machine tool industry must begin to look to other types of work to keep up its share in the war production program.

The war isn't over. By the same token, the contribution of the machine tool industry to the war effort isn't over, but is slated to continue on a high level for some time to come, so far as anyone can see, as 1944 opens.

Meanwhile, the industry should realize that its post-war program need not wait for the availability of materials with which to undertake the production of new machines. We can and must start now the planning and research which are essential if present day machines are to be rendered obsolete by



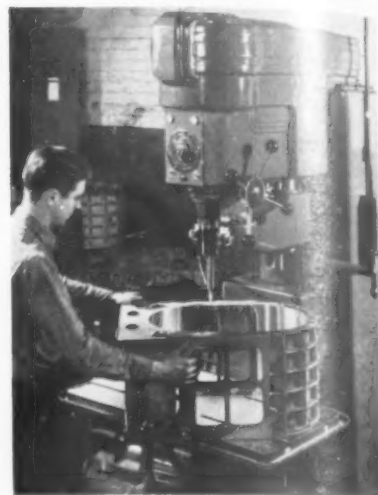
MR. WHIPP

"... sufficient improvements ... to render obsolete much of the equipment still 'making chips' ..."

equipment sufficiently improved in design and operation to become "must" purchases on the part of other industries once the war is over.

At Monarch, we are well along on our program of post-war planning and are confident that there still remain sufficient improvements to be made in existing designs of machine tools to render obsolete much of the equipment still "making chips" in industry.

WARNER & SWASEY MAKE NEWS



Warner & Swasey looks to post-war with new precision threading and tapping machine.

CLEVELAND—Warner & Swasey Company, which has been advertising that "It is patriotic to plan now for the post-war era", has taken its own advice.

Long famous as a turret lathe builder, W & S has announced a new product with real post-war implications: A precision threading and tapping machine designed to tap or cut threads at mass production speeds and capable of holding such threads to "Class 5" tolerance.

Manufacturing rights for the machine, which will be produced in Cleveland, was acquired from the Bakewell Manufacturing Company, Los Angeles. Sales will be handled by offices now handling turret lathes.

ernment's financial wringer.

Because the builders have been fighting hard to convince Congress that the renegotiation law should be changed to exclude producers of war-built items that are not expendable in combat, it is said, only a few of them actually have agreed to renegotiation terms. In most cases, they have not been pressed by local adjustment boards for final settlement.

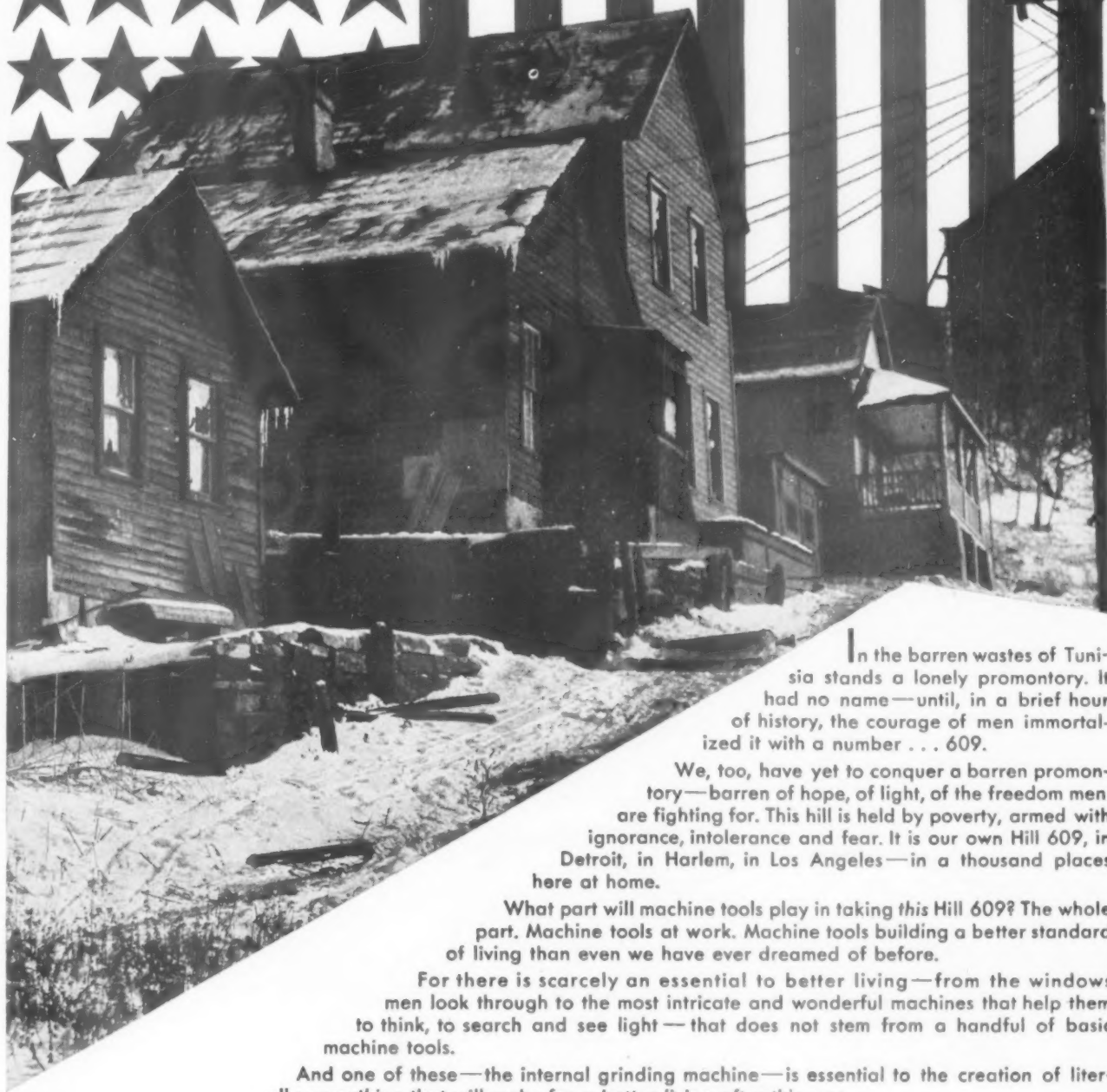
Judging from the precipitous decline in machine tool orders during the past six months, the industry appears to face a bad year with really tough sledding before the end of 1944.

Actually, currently declining orders do not reflect a reliable picture of what is in store for machine tool builders during the next 11 months. After studying war production schedules, and consulting with the various branches of the armed forces, as well as industry itself, the Tools Division of the WPB has proffered the opinion that machine tool orders in 1944 will total approximately \$375,000,000. Though this figure is far below the industry's peak war-time volume, it spells boom business in any machine tool man's book. It represents more than twice the industry's best pre-Pearl Harbor annual production.

Regarding the reliability of the WPB prediction, it is interesting to note that (Continued on page 132)

What part will machine tools play in helping to take

this HILL 609?



In the barren wastes of Tunisia stands a lonely promontory. It had no name—until, in a brief hour of history, the courage of men immortalized it with a number . . . 609.

We, too, have yet to conquer a barren promontory—barren of hope, of light, of the freedom men are fighting for. This hill is held by poverty, armed with ignorance, intolerance and fear. It is our own Hill 609, in Detroit, in Harlem, in Los Angeles—in a thousand places here at home.

What part will machine tools play in taking this Hill 609? The whole part. Machine tools at work. Machine tools building a better standard of living than even we have ever dreamed of before.

For there is scarcely an essential to better living—from the windows men look through to the most intricate and wonderful machines that help them to think, to search and see light—that does not stem from a handful of basic machine tools.

And one of these—the internal grinding machine—is essential to the creation of literally everything that will make for a better living after this war.



BRYANT CHUCKING GRINDER COMPANY

SPRINGFIELD
VERMONT, U.S.A.

*At Least
25%
more output*

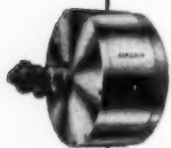
Production will go up at least 25% when you install "Airgrip" Chucks and Revolving Cylinders. You will get more power than you need—holding power that will not fail up to the limit of machine power and tool endurance—power that means you can work every "Airgrip" equipped machine at its absolute maximum.

"Airgrip" Chucks, made in both two-jaw and three-jaw types, permit heavier cuts, coarser feeds—faster production—more parts per hour—at lower cost per unit.

"Airgrip" Revolving Air Cylinders embody the features which make for top performance and minimum maintenance.

Install "Airgrip" Devices now! Produce more for war and be ready to enter peacetime markets faster and at competitive prices.

Anker-Holth engineers are fully prepared to help you now with your pneumatic and hydraulic problems.



• This is the new Hi-Po super-charged hydraulic pump that delivers smooth, chatter-free power at 3000 lb. pressure. It is driven by a $\frac{1}{2}$ -hp. motor.

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COUNTER BORES • REAMERS • STANDARD END MILLS AND MILLING CUTTERS FROM STOCK • SPECIAL CARBIDE TIPPED TOOLS



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CHRYSLER

STUDEBAKER

OTIS ELEVATOR

McQuay-Norris

Massey-Harris



Allison

OLDSMOBILE

DEERE & COMPANY



JACK & HEINTZ

NASH MOTORS

CRANE KEARNEY & TRECKER

Ford

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AIR ASSOCIATES

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BORG-WARNER



IT IS SIGNIFICANT THAT THE
VITAL PARTS OF SO MANY WORLD
FAMOUS QUALITY PRODUCTS ARE
MACHINED WITH LAKE SHORE TOOLS

Back of every Lake Shore Tool are the facilities and skilled personnel of one of America's most completely equipped plants.

LAKE SHORE TOOL WORKS

Division of Carbide Tool Company

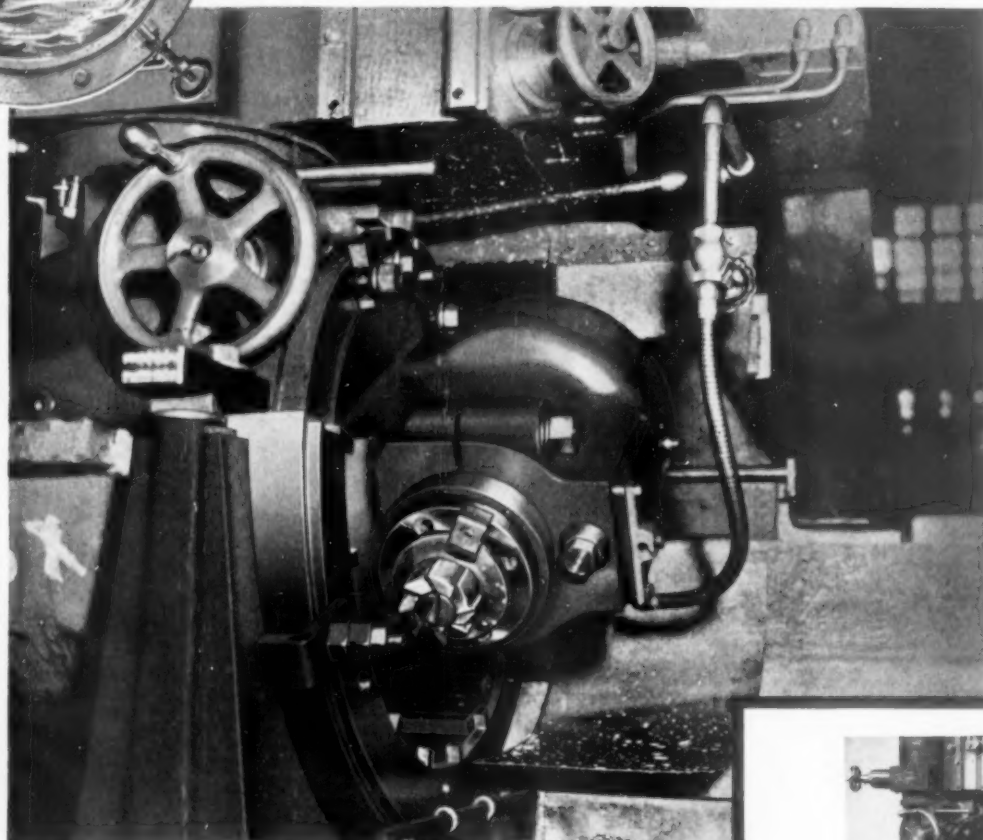
Send us your blue prints for quotations on your high speed tool, special tool, and carbide production tool requirements.

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FEBRUARY, 1944

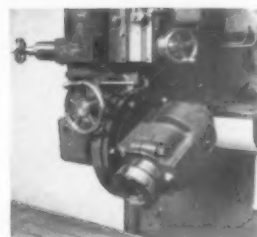


Take a Tip from the Ship Yards ON MACHINING SLOTS INSIDE HALF-ROUND BEARINGS

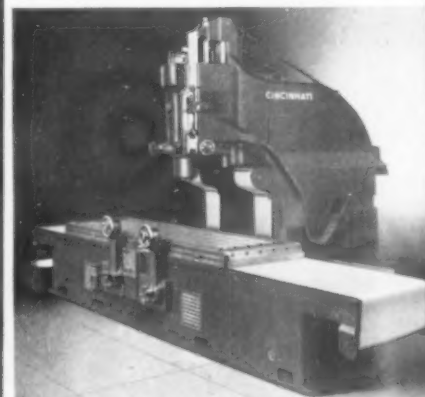


The slots in bearing struts always presented one of the most difficult machining jobs in shipyards. Two or three years ago when production was of little consequence, there was no urge to change, but with the requirements for more and more ships, something had to be done about speeding up this operation. A CINCINNATI engineered Universal Index Milling Attachment, on a CINCINNATI 28" Series Vertical Hydro-Tel Miller, solved the problem. The machine has the capacity and power for milling these large parts, and the attachment is designed so that it may be indexed to several milling positions within a radius of 180 degrees. This method of machining the slots is much faster than the previous method... *the work requires only one setting and the attachment may be quickly indexed from one cut to the next.*

The attachment is a typical CINCINNATI Service Engineering development for more rapid production through the use of the right machine, fixture, and cutters. Talk over your milling jobs with this group of authorities; they may find a more profitable and productive method for handling your milling operations.



Above: Universal Index Milling Attachment. It has No. 50 standard taper hole; quick change collet; 1 1/2 to 1 speed ratio, index plate for locating angular position of attachment spindle.



Above: CINCINNATI 28" Series Vertical Hydro-Tel Milling Machine. Specification catalog M-1018-2 gives complete information.

THE CINCINNATI MILLING MACHINE CO. CINCINNATI, OHIO

DRILLING MACHINES SURFACE GRINDING MACHINES CUTTER GRINDING MACHINES

INDUSTRIAL NEWS DIGEST

... a review of significant developments and new techniques
in mass production industries ...

WPB RESHUFFLE

- Boulware and Bunker promoted to new executive positions

WASHINGTON — In a reshuffle of top-drawer WPB executives, the nation's war production management last month got a new set of bosses. Lemuel G. Boulware now is WPB vice chairman of operations, while Arthur H. Bunker has assumed the newly created position of vice chairman for metals and minerals.

These promotions, announced respectively by Donald Nelson and Charles E. Wilson, followed the departure from Washington of H. G. Batcheller, Allegheny Ludlum Steel Corporation, who sparked the smooth running machine Wilson has created to direct the war production effort.

Boulware is described as the WPB's obscure, number one bottleneck buster. Previously, he served as deputy controller of shipbuilding. In this new post he assumes direction of all industry operations and divisions except steel, copper, aluminum and magnesium, and the minerals bureau. The latter operations are directed by Bunker.

At the same time, WPB vice chairman Donald D. Davis was handed the responsibility of directing all of the agency's field operations.

CUTTING TOOL NEWS

- Manufacturers' association files articles of incorporation

DETROIT—Articles of Incorporation for the Cutting Tool Manufacturers Association, a non-profit corporation, have been filed in Wilmington, Delaware, according to W. G. Robbins, Chairman of the Board of Directors elected at an organization meeting here in December.

The Board also has completed the preparation of By-laws. These are being distributed to those attending the organization meeting, complete with membership application blanks.

Nearing completion are plans for organization meetings in other industrial sections of the country, it has been learned. At these meetings the purposes of the organization will be presented in the same manner as at the meeting for Michigan companies in Detroit. Membership applications also will be made available at these meetings.

A review of the By-laws reveals that membership is available to any individual, partnership, firm or corporation engaged in the manufacture of tools

designed for cutting materials through use with power driven machinery. Manufacturers of hand operated cutting tools are specifically excluded. There is no initiation fee for membership. Dues are on a sliding scale, depending on the number of employees of the individual manufacturer's organization. Each manufacturing organization, regardless of size, is entitled to only one vote in Association affairs, Robbins said.

Each company member may appoint one or more individuals to represent it in activities of the Association but voting is by companies rather than by individuals.

The By-laws provide for a President, Vice-President, and Treasurer, as well as an Executive Secretary. All except the last named will serve without compensation and are elected by the Board of Directors. The Board of Directors is to be made up of 12 members, not more than 6 of whom are to be from any one state. To expedite the growth of the Association during its first year, however, this latter provision does not take effect until the 1944 Annual Meeting.

In order to give other sections of the country representation during the

(Continued on page 117)

Nobel Prize Winner for Engineering



Nobel Prize Winner Dr. Benjamin J. Lazan beside a new dynamic balancing machine in the shops of the Sonntag Scientific Corporation, Greenwich, Connecticut.

To youthful Benjamin J. Lazan, Sonntag Scientific Corporation, has gone the coveted Alfred Nobel Prize for the most outstanding engineering research work in 1943.

Twenty-six-year-old Lazan is vice president and chief engineer of Sonntag, an affiliate of The Baldwin Locomotive Works. He received the award for his paper, "Some Mechanical Properties of Plastics and Metals Under Sustained Vibrations". Presentation of the prize was made at the recent annual meeting of the American Society of Mechanical Engineers, New York.

After teaching engineering, Lazan joined Sonntag in 1942 as research engineer in machines and materials.

"GREENIE"

T.M. REG. U.S. PAT. OFF.

Guy With Keen Eye



Change to Broaching



This photograph shows a part produced by the shaving method. Notice the "break out" and the poor finish.



This part was broached. Note the finish and accuracy are greatly improved.

- ★ INCREASES ACCURACY
- ★ IMPROVES FINISH
- ★ STEPS-UP PRODUCTION
- ★ REDUCES REJECTS
- ★ LOWERS COSTS

The radius on the top of the tongue in the part shown above was formerly finished by shaving. The results using this method were not entirely satisfactory since close tolerance and good finish could not be obtained. The percentage of rejects was also high due to the "breaking out" of the underside of the tongue under the pressure of the die.

Broaching the part made possible better accuracy and finer finish. Besides this, production was increased and costs were lowered.

There are operations in every plant where broaching can improve on the present method of production. Detroit Broach Company engineers will be glad to apply their knowledge and experience to your production problems.



DETROIT BROACH COMPANY

20201 SHERWOOD AVENUE
9308 SANTA MONICA BLVD.

DETROIT, MICHIGAN
BEVERLY HILLS, CALIFORNIA

Too much praise cannot be given the American cutting tool industry for its production efforts since Pearl Harbor. Because many readers of The Tool Engineer magazine, who are buyers and users of cutting tools, are interested in the post-war outlook for this industry, some of its leaders have been invited to present here their views on the subject.



LOWER COST OF MANUFACTURING WILL RAISE STANDARD OF LIVING

GUSTAV VON REIS
PRESIDENT
DETROIT BROACH COMPANY

● When thinking of the post-war outlook in metal cutting, it is very evident that use of broaching will be increased tremendously as compared with pre-war operations.

This is due principally to three factors: 1—War production has taught us to use broaches on many more applications than was previously thought possible; 2—Broaching is highly efficient, and because post-war industry will be highly competitive, manufacturers will be forced to turn to this method of finishing metal and other parts; 3—Post-war products will require greater accuracy than is possible by comparable methods.

On a recent tour, I found the following opinion prevalent among cutting tool manufacturers:

Unless the Government permits re-



"Unless the Government permits retention of adequate reserves to bridge the transition . . ."

tion of adequate reserves to bridge the transition period from war to peacetime production, and to develop new and better cutting tools, the industry will disintegrate. In order to prevent such a collapse, it is imperative that present methods of renegotiation be modified to allow necessary funds for reconversion.

In addition, one more important factor in the post-war advancement of manufacturing in the United States is necessary—the complete cooperation of labor. This means that labor must understand that its sole function in industry is to produce as efficiently as possible with the methods and physical equipment provided by management.

By achieving these objectives, we can lower the cost of manufactured goods, which in turn will mean a higher standard of living.

of Directors is by the membership from nominations by a Nominating Committee, not more than one member of which may be a member of the Board of Directors. It is provided also that not more than one representative of any one company may serve as a Director or Officer. A member or representative of a member cannot serve as a director or officer for more than seven consecutive years.

While membership dues are not high, it was said, they are adequate to permit the employment of a high-caliber executive secretary together with the necessary clerical force.

Among the purposes of the Association, Robbins said, are assistance to not only the cutting tool industry but also Federal and local agencies on such subjects as renegotiation, taxes, contract cancellation and termination, disposal of surplus cutting tools by the Armed services, standardization of cutting tools to permit greater simplification of production equipment and methods,

problems arising from cancellation, etc., of pool orders and post-war disposal of emergency manufacturing facilities.

PRICE REDUCTION

● Carboloy announces cut of 25 per cent on milling cutters

DETROIT—Recent price reductions by Carboloy itself are being followed this month by a really substantial price reduction — 25 per cent — on standard Carboloy Tipped milling cutters made by Super Tool Company, Detroit.

The reduction, Super Tool says, comes at a time when the demand for these cutters has reached an all-time high. This lower price, it is believed, will permit the use of Carboloy tipped milling cutters on many short run and shop tooling jobs that hitherto have been reserved for less expensive cutters. Price reductions announced cover the entire line of milling cutters consisting of five standard sizes.

TURBINE PRODUCTION

● Philadelphia plant sets records with mass production methods

PHILADELPHIA—The ultimate in mass production metal working has enabled one of the Quaker city's largest war-time industries to set one of the nation's outstanding war production records.

Propulsion machinery for nearly 1,000,000 tons of ocean shipping, enough to land and continuously supply two divisions of fighting troops, was delivered from the new Westinghouse Merchant Marine plant here during the past year, according to Ellis Spray, manager.

In terms of ship tonnage, he said in summarizing the plant's first year of production, this represents an output nearly two and one-half times as large as the factory's original promise to the Maritime Commission for the first 12 months. Current production is at a rate of more than 1,000,000 horsepower annually.

Spray emphasized that all production from the plant to date, about three times the number of units originally scheduled as "capacity", has consisted of complete propulsion units. Each unit is made up of a high and a low pressure steam turbine, and a set of speed reducing gears to transmit the turbine power to the ship propeller.

When the East Pittsburgh concern started building the Merchant Marine plant here in August, 1941, they had hoped by the first of November, 1943, to be turning out units at a rate of about 55,000 horsepower a month. Actually, by October, more than 85,000 horsepower, 57 per cent more than promised, was built and delivered.

The Westinghouse-built turbine set is used in the faster, larger Victory ship with which the Maritime Commission is supplanting the steam powered Liberty Ship in its 1944 construction program.

To meet the needs of this new construction program, the Philadelphia plant is now changing its production facilities to concentrate wholly on the

(Continued on page 118)

INDUSTRIAL NEWS DIGEST (Continued from page 115)

first year of the Association's operation, provision has been made to elect three directors from other sections—these being in addition to the nine members already elected. In addition to Robbins, Carboloy president, the Board is composed of Oscar L. Bard, president, Michigan Tool Company, Detroit; George L. Buffington, supt. of estimating & process engineering, Ex-Cell-O Corporation, Detroit; E. A. Goddard, vice president, Star Cutter Company, Detroit; R. G. Michell, president, Eclipse Counter-bore Co., E. C. Putnam, president, Putman Tool Company, Detroit; R. M. Severance, president, Severance Industries, Inc., Saginaw, Michigan; and R. H. Wolfe, president, Arrow Tool and Reamer Company, Detroit.

Following the 1944 meeting, four directors will be elected each year. In this manner, continuity of effort can be maintained. Election to the Board



Tannewitz DI-SAWS

*and You'll Want
No Other!*

A broad statement? Yes. But soundly founded on facts—the experience of numerous large manufacturers — the actual performance records of the machines, themselves — and fundamental superiorities of design and construction.

Larger wheels (24" diameter on the standard models) provide greater traction, faster, straighter cutting, more production. Transmissions, common source of die saw grief, never fail in TANNEWITZ DI-SAWS.

STANDARD MODEL No. M24
(24" WHEELS)

Sturdier, heavier construction throughout, plus many refinements of design, make these machines the greatest, trouble-free producers in their field. It pays to buy the best!

With a TANNEWITZ DI-SAW you can do in minutes jobs which require hours by the shaper, miller or lathe methods.

Get the complete facts. Just write for DI-SAW bulletin.

Other Models to Handle Work of Practically Any Size

Made with 30", 36", 48" and even larger throat capacities if desired, the TANNEWITZ "Big Bertha" models make available the tremendous savings of inside and outside sawing, filing and polishing on dies, jigs and other work of practically any size. Write for bulletin.

On request: Bulletins on Single and Variable Speed Foundry Band Saws; Sheet Metal Cutting Band Saws.

THE TANNEWITZ WORKS, GRAND RAPIDS, MICH.

INDUSTRIAL NEWS DIGEST (Continued from page 117)

building of turbines and speed reducing gears for this new vessel. They expect by the end of the year to be producing two and one-quarter times as many turbines and five and one-half as many gears annually as originally promised.

This expansion of production capacity, the plant manager explained, will be principally the result of "mass production" building methods made possible by concentrating on output of a single type of turbines and gears.

Gear production facilities also have been aided, he said, by the addition of \$2,500,000 of gear cutting equipment to the original \$22,000,000 plant, an expansion of approximately 10 per cent.

The Merchant Marine Division, built with Defense Plant Corporation funds is operated by the Westinghouse Electric and Manufacturing Company for the Maritime Commission.

AIRCRAFT GEARS

● Foote Bros. reach 12-month goal of 1,000,000 units

CHICAGO—On December 30, 1943, the employees of Foote Bros. Gear & Machine Corporation reached their goal of 1,000,000 high precision aircraft gears produced in one year, an increase of 53.3 per cent over their 1942 output.

The gears produced by the Chicago concern were for Pratt and Whitney aircraft engines. The tremendous horsepower developed by modern aircraft engines, plus the necessary elimination of every ounce of unnecessary weight, demands that gears be compact and of extreme precision. At the outbreak of war, gears generally were made to such exacting standards by laboratory methods.

Today, three of Foote Bros. four plants are devoted to the manufacture of these precision gears.

In addition to aircraft gears, 6,000 employees of the company are manufacturing gears and speed reducers used on landing barges, airplane turrets, ammunition hoists, marine engines for PT boats and for numerous other military purposes.

TO PASS ON STANDARDS

● GE committee to set up company-wide manufacturing standards

SCHENECTADY, N. Y. — One committee responsible for the development and maintenance of sound design engineering and manufacturing standards and practices for use throughout its entire manufacturing organization has been formed by the General Electric Company.

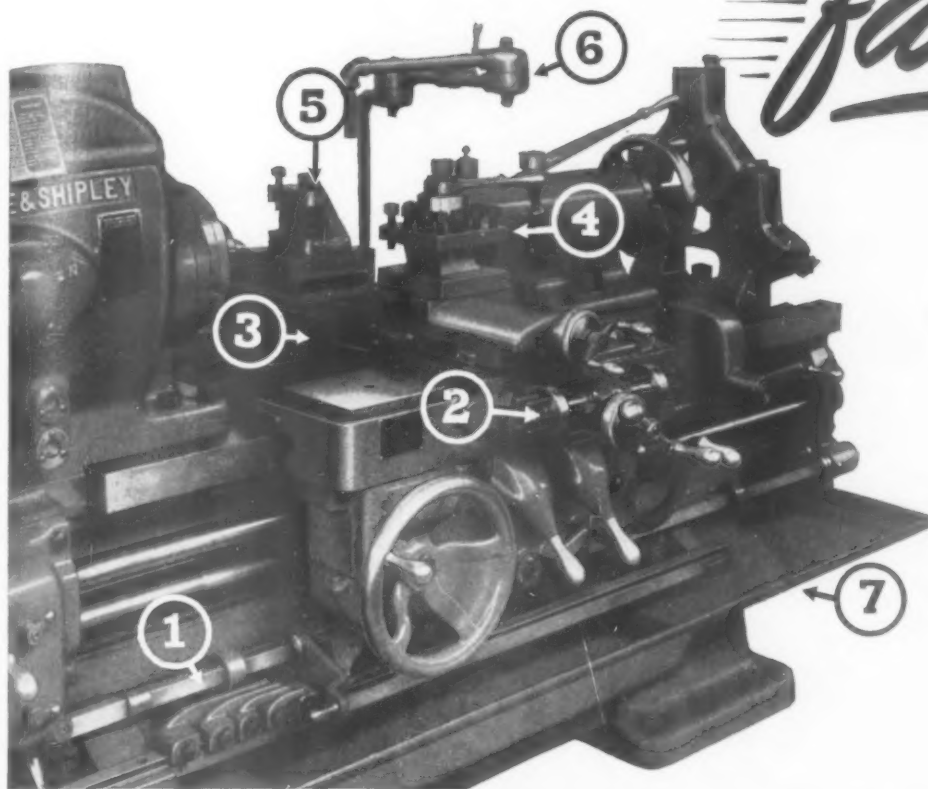
Known as the G-E Standards Policy Committee, it is headed by L. F. Adams, Manager of the Standards Division. Organization of this committee, it has been suggested, may reflect a possible trend in other large industries.

So that the maximum consistency of appearance, interchangeability, and economy in manufacture will be secured for all G-E equipment, the committee will review and determine the adequacy of these standards and practices before giving its approval for general

(Continued on page 120)

Produce SMALL Lots

faster



Original Navy "E"
Awarded March 6, 1942

Why you save time with The Lodge & Shipley Manufacturing Lathe

Change over quickly and easily from one job to another.
Advantageous use of multiple tools and universal holders.
Transfer of diameter and length control from operator to lathe.

OUTSTANDING FEATURES

- | | |
|---|---|
| (1) Multiple Length stops (Telescopic Dog Type), automatically disengage longitudinal feeds. | (4) Four-way tool block on compound rest can be indexed for twelve equally spaced tool positions. |
| (2) Multiple Diameter Stops, for both front and rear tools, can be quickly indexed for establishing diameters. Time wasting "cut and try" eliminated. | (5) High duty tool block in rear used for single tool can be supplemented or replaced with multiple holder. |
| (3) Connected rear rest increases tooling possibilities. Adaptable to single or multiple tools. | (6) Coolant pump and piping. |
| | (7) Chip pan. |

WRITE FOR PUBLICATION No. 482

THE LODGE & SHIPLEY MACHINE TOOL CO.
CINCINNATI, OHIO, U.S.A.

ENGINE

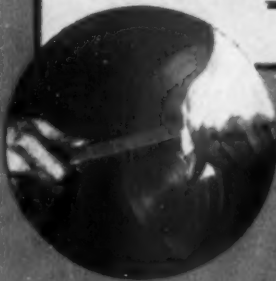
TOOL ROOM

AUTOMATIC

OIL COUNTRY LATHES

Another KENNAMETAL First!

New KENNAMETAL Lathe File Produces Sensational Results



One KENNAMETAL LATHE FILE removed the burrs from 100,000 shells as compared to 800 to 1,000 shells by a steel file—a production ratio of 100 to one!

Just as the introduction of KENNAMETAL-tipped milling cutters in 1939 is revolutionizing the milling of steel, the NEW KENNAMETAL LATHE FILE promises to establish new standards of efficiency and economy in the filing of steel and other metals. For example . . .

- ★ KENNAMETAL Lathe Files permit filing speeds of 3 to 10 times that possible with steel files, matching the unusually high cutting speeds of KENNAMETAL carbide tools.
- ★ KENNAMETAL Lathe Files do not burn up at high speeds but outlast steel files 50 to 200 times.
- ★ KENNAMETAL Lathe Files cut hardened steels up to 62 Rockwell C which the ordinary file will not touch . . . do a noteworthy job on cast iron and brass at surface speeds around 900 feet per minute, and efficiently file high-carbon, high-chromium steels at 800 surface feet per minute.

At present, KENNAMETAL LATHE FILES are available in one size—Style F-76, illustrated. It is 11" long, 3/4" wide, and 3/4" thick, having a substantial filing surface 4" long of grade K4H KENNAMETAL (80.6 Rockwell C), single cut with teeth at 30° shear angle, 40 per inch. Shank is shaped for convenient handling.

PRICES	
1 to 9 files . . .	\$15.00 each
10 to 99 files . . .	\$13.00 each
100 or more . . .	\$12.50 each
F.O.B.	
Latrobe, Penna.	

You too can save time and reduce filing costs with KENNAMETAL Files. Order one today and prove its merits for yourself.



KENNAMETAL Inc.
600 Lloyd Ave., Latrobe, Pa.

SUPERIOR CEMENTED CARBIDES

PATENT
APPLIED FOR

INDUSTRIAL NEWS DIGEST (Continued from page 14)

company use.

When necessary to make a detailed study of a proposed standard or practice or to develop a new company standard or practice, the committee will work with and through existing committees having responsibility in their respective fields.

American standards approved by ASA and other nationally accepted standards developed by the AIEE, ASTM, and SAE will continue to be utilized without change in so far as they are applicable, it was said.

Membership of the committee consists of manufacturing executives, including engineering assistants to works managers, the general superintendent of each Works, and a representative of each of the Appliance and Merchandise, Electronics and Lamp Departments.

MATERIALS

CADMIUM COATING

- Electroplated deposits are 50 times normal thickness

Wilmington, Del.—Cadmium is now being electroplated on base metals in coats more than 50 times as thick as those normally deposited, E. I. du Pont de Nemours & Company's Electroplating Division has disclosed.

Cadmium coatings, to prevent corrosion of steel or iron, are being plated in heavier coats on steel sheets for use in war production du Pont cadmium anodes and "Cadalyte" cadmium plating salt produce the extreme corrosion resistance required, it is said.

User: Heavy steel sheets are being plated by Thomas-Thiel, Incorporated, Wilmington, which says the size of the sheets, in combination with the depth of the coating, approaches a record.

Approximately 30 pounds of cadmium are being deposited on each sheet 8' x 2' x 1" in a uniform coat about .02-inch thick. Normal thickness has been .003-inch.

Anodes of pure cadmium metal are used along with the "Cadalyte" plating solution which is placed in the tank to a depth sufficient to immerse the steel plates. These heavy plates are suspended on the cathode racks and moved lengthwise in the tank throughout the 40-hour plating process.

The complete operation is completed in stages because sandblasting of the base metal surfaces left projections on which "trees" or spikes of cadmium tended to be deposited.

Between each stage the trees are buffed off, and the sheets are then returned to the tanks for further processing. This plating by stages, according to du Pont engineers, increases corrosion resistance.

ASA ANNIVERSARY

- 25 years of service completed by Standards Association

NEW YORK—The American Standards Association has completed a quarter century of service to industry and the government in the field of standards.

At a meeting celebrating the event (Continued on page 123)

THE CINCINNATI SHAPER CO.

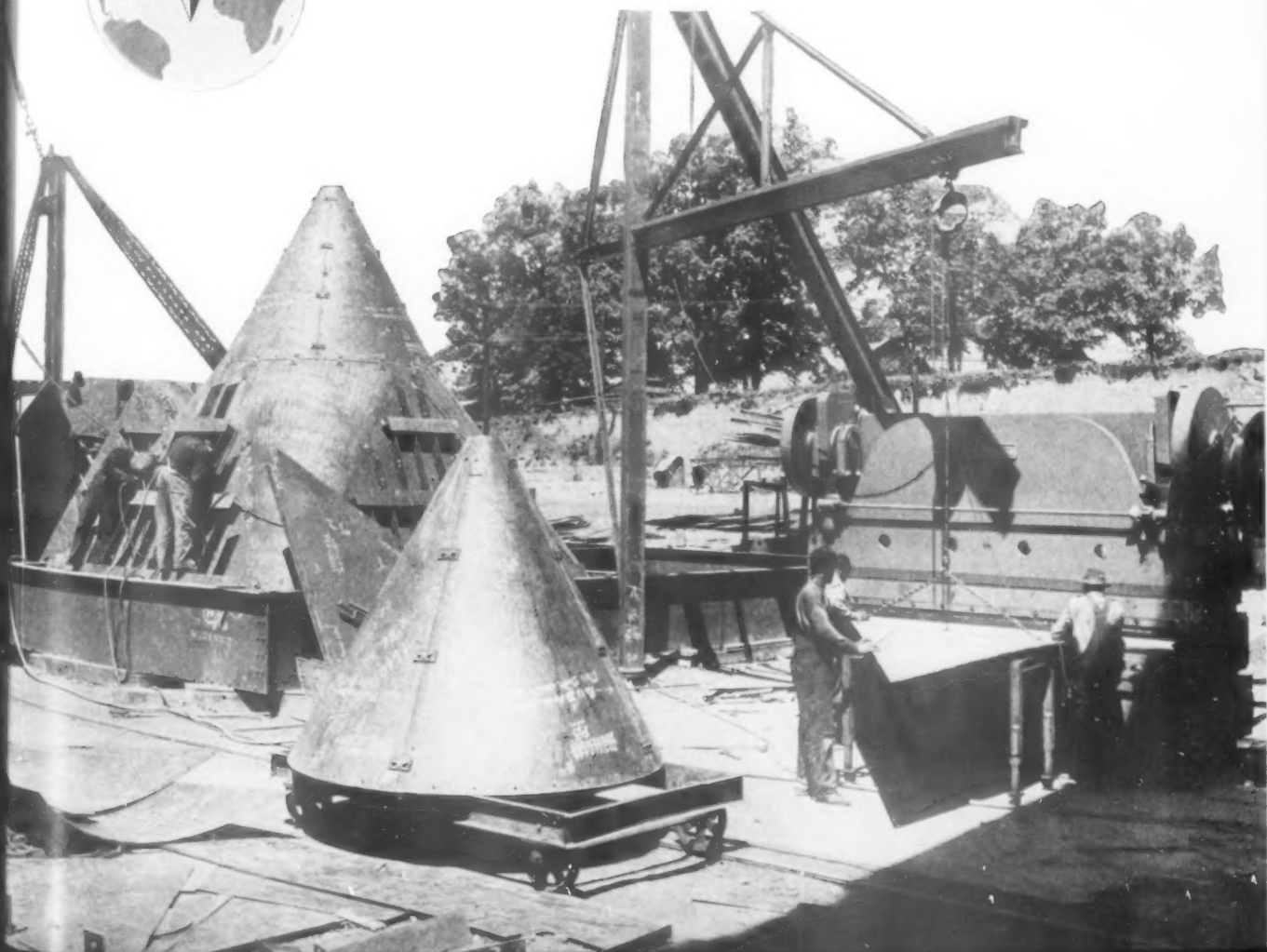
CINCINNATI OHIO U.S.A.
SHAPERS · SHEARS · BRAKES

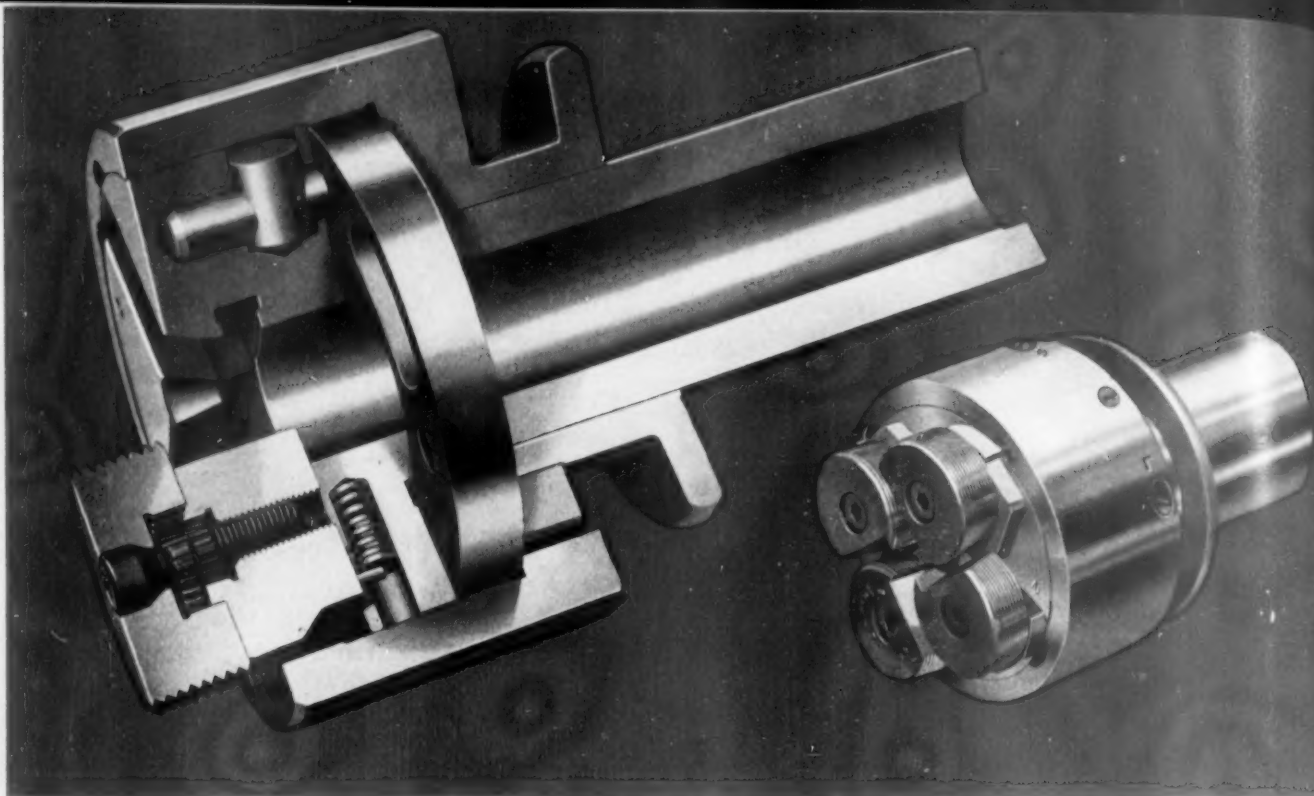
"High Octane" **STARTS ON THIS BRAKE**



"Cracking gas" to crack the Axis is important work these days. The illustration shows the forming and progressive assembly of multi-piece cones used in the gas cracking process. It may suggest to you a valuable use for a Cincinnati Press Brake.

Write for Catalog B-1, illustrating the many applications of Cincinnati Press Brakes.



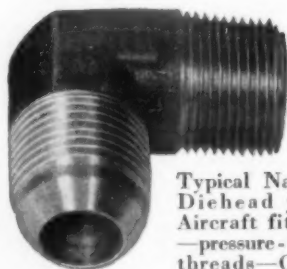


SIMPLICITY DOES IT!

Simple in design—that's the main reason for the strength, precision and unvarying performance of Namco Circular Chaser Dieheads.

Adjustment for all four cutting tools is quick and positive—through only two screws—and adjustment "stays put".

When Circular Chasers need replacement, a duplicate set can be inserted in head in two minutes. No trying for size, no delay, no spoiled work. Uniform production is maintained on long run lots of straight or taper threads on pressure-tight fittings.



Typical Namco Diehead job. Aircraft fitting—pressure-tight threads—Class 3 standard.

Circular thread chasers ground to gauge accuracy, may be reground through 270° circumference—they last ten to fifty times longer!

Chasers and blocks may be interchanged with circular hollow mills in the same double-duty head. Heads are available for both stationary and revolving spindle machines—capacities $\frac{5}{16}$ " to $4\frac{7}{8}$ ".

Here are the most efficient threading and hollow milling tools made—for a wide variety of work on all standard automatics. Catalog D-42 gives details.

THE NATIONAL ACME CO.

170 EAST 131ST STREET • CLEVELAND, OHIO

ACME-GRIDLEY 4-6 AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS • SINGLE SPINDLE AUTOMATICS • AUTOMATIC THREADING, DIES AND TAPS • THE CHRONOLOG • LIMIT AND CONTROL STATION SWITCHES • SOLENOIDS • CENTRIFUGES • CONTRACT MANUFACTURING

(Continued from page 120)

was announced that the Board of Directors of the Association had authorized participation in an Allied Nations Standards Body. The organization of such a body recently has been a subject of discussion between the British Standards Institution, the American Standards Association and also with key governmental agencies in the three countries.

Function of the organization is to stimulate cooperation between the al-

lied countries in standardization matters as an aid to production and use.

A skeleton staff will be provided with offices in London and in either New York or Washington, ASA said.

Association officers for 1944, announced at the meeting, are: Henry B. Bryans, Executive Vice President, Philadelphia Electric Company; President-Elect; George S. Case, Chairman of Board, Lamson and Sessions Co., re-elected Vice President; H. S. Os-

borne, Chief Engineer, American Telephone and Telegraph Co., re-elected Chairman, Standards Council which is in charge of all ASA technical work; and E. C. Crittenden, Assistant Director, National Bureau of Standards, re-elected Vice Chairman, Standards Council.

During the past twelve months, it was announced, the Association had approved 119 standards, 93 more new standards than in any other year.

(Continued on page 125)

Auto Makers Adopt Tool Steel Symbols

DETROIT—All domestic high speed steels in cutting tools used by the three largest automobile manufacturers will now be uniformly classified and marked with symbols for identification.

Uniform classification and symbols for identification of domestic high speed steels were adopted recently by General Motors, Chrysler Corporation and Ford Motor Company at a meeting of their engineers here. Henceforth, these concerns announced to cutting tool manufacturers, all tools made for them must be marked according to the set of symbols adopted by the three companies.

Trade names of tool steels are retained in the classification and symbol charts presented to vendors, a representative of one concern pointed out. The only deviation from current practice in marking tools, it was explained, is the replacement of a steel trade name with capital letters and numerals. By referring to the charts adopted by the motor makers, not only the trade name but actual analysis of the steel can be

found. To save space, brand names in the charts are not reproduced below.

Adoption of the uniform symbols, one automobile engineer said, is expected to effect substantial savings through elimination of confusion in the shop in handling worn high speed steel cutting tools.

According to the chart, all cutting tool steels in which tungsten is the major alloying element will be designated by the letter "T". Those in which molybdenum is the major alloying element, even though tungsten is present, will be designated by the letter "M". Specific analysis, in each case, is designated by a numeral. The last character of the three-part symbol is a capital letter assigned to the maker of that particular analysis.

Because of the increasing use of high speed steels of analyses other than 18-4-1, General Motors points out in its classification chart, it has become advisable to have all high speed steels tools marked with standard symbols for

ready identification for the following reasons: (1) Relative performance of various analyses of high speed steels may be readily checked; (2) Worn out tools may be easily sorted by analysis for maximum scrap value; (3) Tools being salvaged by annealing and re-hardening may be given the correct heat treatment.

General Motors states in its chart that "this is not a technical exposition of high speed steels and reference is made to the steel manufacturers for more specific technical information. Only domestically produced brands that are commonly encountered are listed and omission of any brand must not be construed as derogatory to that brand or its producer."

Since it is not known that this steel identification method has received endorsement from any technical publication or society, it is believed that its further adoption by cutting tool users will rest entirely on any merits they may see in the method. THE END

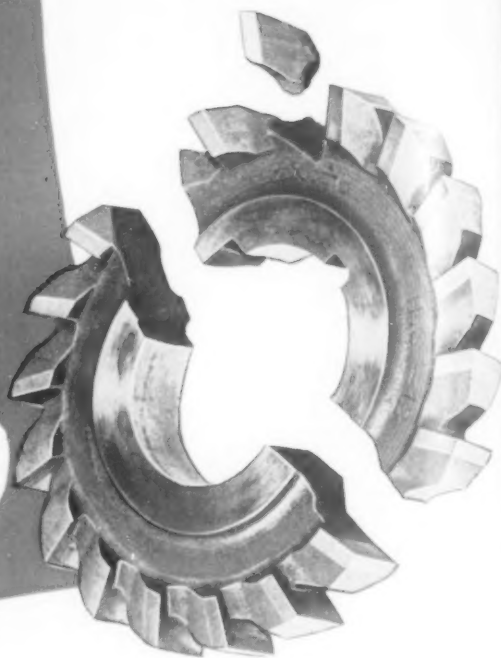
Three automobile manufacturers have agreed on symbols for identification of domestic high speed steels for cutting tools. In the future, they have announced, all tools purchased by them must bear these symbols identifying alloy analysis and trade name. Reproduced

here are symbol charts from the General Motors standard. Charts 1 and 2 are for tungsten steels. Charts 3 and 4 cover molybdenum types. A complete symbol is made by adding to the analysis symbol the letter designating the steel producer.

CHART I					CHART II			
TUNGSTEN HIGH SPEED STEELS—"T"					Symbol	Company	Symbol	Company
Chemical Composition in Percentage				Analysis Symbol				
Tungsten	Chromium	Vanadium	Cobalt					
18.00	4.00	1.00		T-1	A	Vanadium Alloys Steel	I	Braeburn Alloy Steel
18.00	4.00	2.00		T-2	B	Firth Sterling Steel	J	Halcomb Steel
18.00	4.00	3.25		T-3	C	Henry Meston & Sons	K	Carpenter Steel
18.00	4.00	1.00	4.00	T-4	D	Universal Cyclops Steel	L	Midvale Steel
18.00	4.00	2.00	8.00	T-5	E	Bethlehem Steel	N	Simonds Saw & Steel
22.00	5.00	1.50	12.00	T-6	F	Latrobe Electric Steel	P	Vulcan Crucible Steel
14.00	4.00	2.00		T-7	G	Allegheny Ludlum Steel	W	Jessop Steel
14.00	4.00	2.00	5.00	T-8	H	Columbia Tool Steel	X	Crucible Steel

CHART III						CHART IV			
MOLYBDENUM HIGH SPEED STEELS—"M"						Symbol	Company	Symbol	Company
Chemical Composition in Percentage					Analysis Symbol				
Molybdenum	Chromium	Vanadium	Tungsten	Cobalt	Boron				
8.00	4.00	1.00	1.50			M-1	A	I	Braeburn Alloy Steel
5.00	4.00	1.50	6.00			M-2	B	J	Halcomb Steel
8.00	4.00	2.00				M-10	C	K	Carpenter Steel
8.00	4.00	1.00		2.50	Added	M-20	D	L	Midvale Steel
8.00	4.00	1.00				M-30	E	N	Simonds Saw & Steel
8.00	4.00	1.00	1.50	4.00		M-40	F	P	Vulcan Crucible Steel
8.00	4.00	1.50			Added		G	W	Jessop Steel
8.00	4.00	1.50		8.00	Added		H	X	Crucible Steel

It's *easy* and
it's *inexpensive* to
repair broken
cutting tools with
EASY-FLO



Typical EASY-FLO repair—3"x5/8" milling cutter. Here's how it was done: broken surfaces cleaned and fluxed. Two large parts clamped together with a piece of .003" EASY-FLO strip between. Heat applied with torch. After alloy had set, broken tooth was brazed in place, using EASY-FLO rod, hand fed. Whole job was easy, quick, inexpensive.

This is the common experience in hundreds of companies where drills, taps, broaches, reamers, milling cutters, form cutters, forming tools, saws, punches, dies and other types of tools are constantly being repaired.

IT'S EASY - - because anyone who can handle a torch intelligently can do the work. And even this skill is not important where EASY-FLO is preplaced in strip form and the heating is done in a furnace or by other available means.

IT'S INEXPENSIVE - - because, in the general run of breaks, the entire EASY-FLO brazing operation is a matter of minutes, and seldom requires more than a few cents worth of EASY-FLO.

The low working temperature, exceptional fluidity and fast action of EASY-FLO and the remarkable strength of EASY-FLO brazed joints are the factors that make practical these fast, inexpensive tool repairs. **Try EASY-FLO brazing** and find out for yourself how readily you can restore broken cutting tools to good-as-new working condition.

ASK FOR BULLETIN 12-A

It gives full EASY-FLO details. Copy mailed on request. Write for yours today.



82 FULTON ST., NEW YORK 7, N. Y.

Bridgeport, Conn. • Chicago, Ill. • Los Angeles, Cal. • Providence, R. I. • Toronto, Canada

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RAILROAD WORK

● A-C arc welding used in difficult fabrication

ONEOTA, N. Y.—A-c arc welding is playing an important part in the fabrication of car parts from salvaged material in connection with a heavy freight car repair program at the Delaware and Hudson Railroad Corporation's car shops here.

Compelled by wartime shortages of steel to expand already well established salvage and reclamation practices, the company has increased the use of a-c arc welding because it overcomes the effect of the arc-blow common to d-c welding, the concern's engineers state. This has resulted in an improvement in both the quality and the speed of the welding.

It was also found that a-c welding is better adapted to welding in tight corners and at difficult angles. This condition is regularly encountered when welding together a combined center

SUPER GAGE

● Behind all precision tools stands that super-precise device, the master gage.

Notable among such recently designed devices is the Electrigage by which accuracy of thread gages, threaded parts, machine-tool lead screws and racks can be checked. The instrument is graduated in 50-millionths of an inch and readings can be interpolated to about 12-millionths of an inch. This is equivalent to finding an error of about three quarters of an inch in a mile.

Applied to an internal-external measuring instrument with the same accuracy, the device checks the outside or inside of a ring for taper, bell, or out-of-round conditions. Developed jointly by the Sheffield Corporation and Westinghouse, this device uses a mechanical pickup that has a feather touch of about three ounces.

Movement of the gaging stylus alternates a magnetic circuit to produce a current indication. Amplified as much as 10,000 times and fed to a specially sensitive milliammeter (with a linear scale and zero center) the pointer shows plus or minus error.

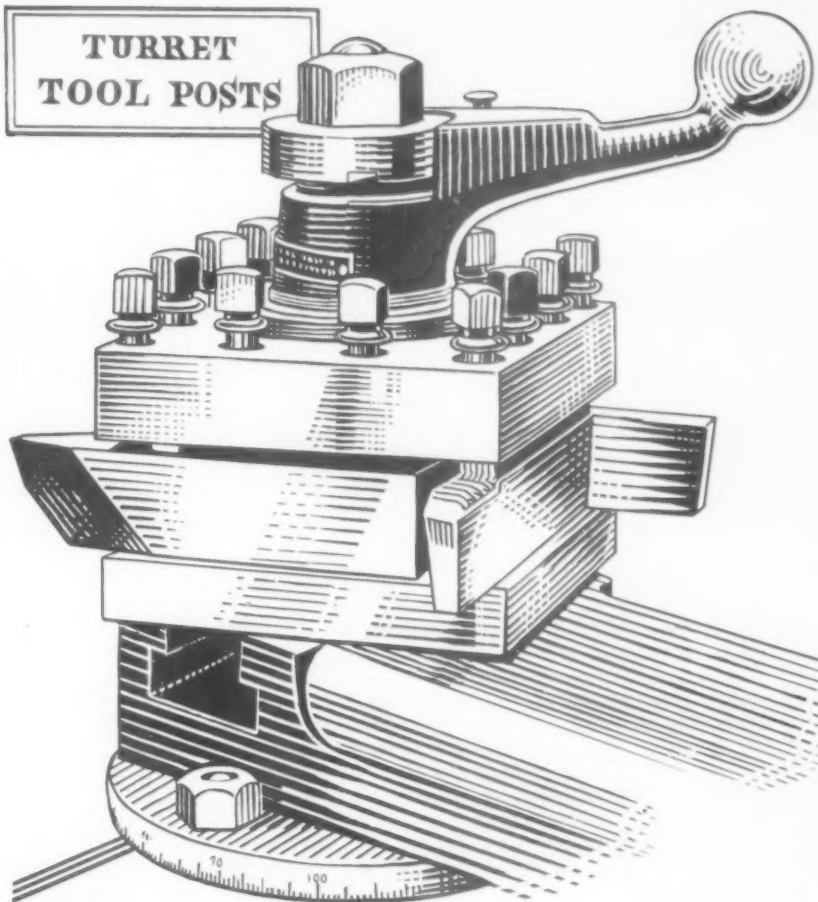
sill filler and back draft stop, which is fabricated from old channels, angles, and plates. Although the operator must work in confined corners, the absence of arc-blow makes it possible to deposit sufficient metal and to obtain the penetration required to give this assembly the maximum strength required.

A-c arc welding is also used in the case of pieces of center sills salvaged from the underframes of damaged cars. Straightened in presses, the serviceable pieces are welded together and splice plates are then welded on to form full-length center sills.

Among numerous pieces of equipment fabricated by a-c arc welding in this railroad shop are special purpose

(Continued on following page)

TURRET TOOL POSTS



DEMANDS of war production have proved the versatility of the modern engine lathe. This fundamental machine tool has been successfully adapted to many complicated jobs previously done on more specialized machines.

McCrosky Turret Tool Posts have helped engine lathes meet this opportunity for wider service. The rugged McCrosky Turret enables an engine-lathe operator to set up at one time all the tools required for a multiple-operation job. Indexing is easy and accurate. As a tool is needed for each successive operation, the operator simply turns the clamping handle and rotates the body into the new position. The locking mechanism provides extreme rigidity and freedom from vibration.

McCrosky offers two types of mountings—in the T-slot of the compound rest—bolted to the bolt circle of the main slide; five styles (including a small bench-lathe turret) and several sizes in each style.

For Turret Bulletin Write to
McCrosky, Meadville, Pa.

McCrosky Tool Corporation
MEADVILLE, PA.

**COST
CUTTING
TOOLS**



PRODUCTION PIX

WHAT'S DOING IN THE WORLD OF MASS MANUFACTURING



Machining operations on dual-purpose 5-inch naval gun breech housings are done in this section of the Fisher Body Grand Rapids Stamping Division plant. Within six months after the contract for this precision assembly was received, all production equipment was installed. Volume production now is increasing monthly.

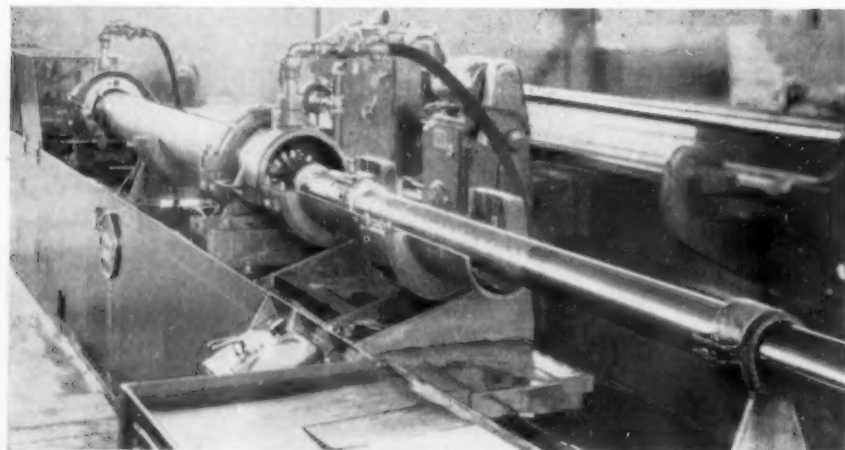


These four "Engineering Cadets" are typical of 634 girls who have completed 10-months' aeronautical engineering courses sponsored by Curtiss-Wright Corporation at seven leading colleges.

Old bolts are rethreaded at a cost of four mills each in this automatic machine at the Kaiser Vancouver shipyard, against an original cost of seven cents. Fifty per cent of old worn, battered, or otherwise damaged bolts can be reclaimed. Those beyond repair are sent to foundries as scrap.



Before forming operations are begun on hollow steel propellers at the American Propeller Division of Aviation Corporation, Toledo, the inside diameter of the tube is honed to remove any surface imperfections preparatory to grinding the outside diameter.



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INDUSTRIAL NEWS DIGEST

(Continued from page 125)

four-wheel trailer wagon platforms made from salvaged material. Since confined corners and sharp angles are common in this type of construction, the absence of arc-blow tends to improve the quality of the weld and to reduce the welding time.

TORPEDO PRODUCTION

● Amercorp first to turn out "fin fish" for U. S. Navy

ST. LOUIS—With official recognition recently of its outstanding record in the manufacture of torpedoes, interesting facts were made public on the Amercorp Corporation plant here, built and operated for the Navy by the American Can Company.

The \$12,000,000 St. Louis plant, which turned out the first commercially produced torpedo in this war and has been building more of them in recent months than the combined pre-war output of the nation, is now being retooled for quantity manufacture of another type. Carl G. Preis, general manager and vice president in charge of engineering revealed before more than 5,000 employees at an "E" Award ceremony.

Currently, torpedo production in the plant, one of the world's largest, combined with the output of another Amercorp unit in Forrest Park, Illinois, is nearly twice that of any other industrial producer in the United States, Preis said.

"Your plant has been the pioneer in the Navy's commercial torpedo program. Yours was the first plant to produce a torpedo on a commercial basis during the present war and this is the first Naval Ordnance plant operated by a private concern ever to produce a torpedo," said Captain Carl H. Bushnell of the Navy Bureau of Ordnance.

REFRIGERATION

● Coolant oils in surface grinding are chilled economically

MEADVILLE, PA.—A practical and economical method of chilling the coolant oils during high speed surface grinding is being employed by the McCrosky Tool Corporation, manufacturers of cutting tools, according to J. C. Tweedell, Field Manager for the York Corporation.

Chilling the coolant oil to a constant temperature enables continuous operation of the machines for the first time, Tweedell said. This application of refrigeration results in saving of time, skilled labor, and oil which may be reused. Also, the life of the machine is prolonged, he added.

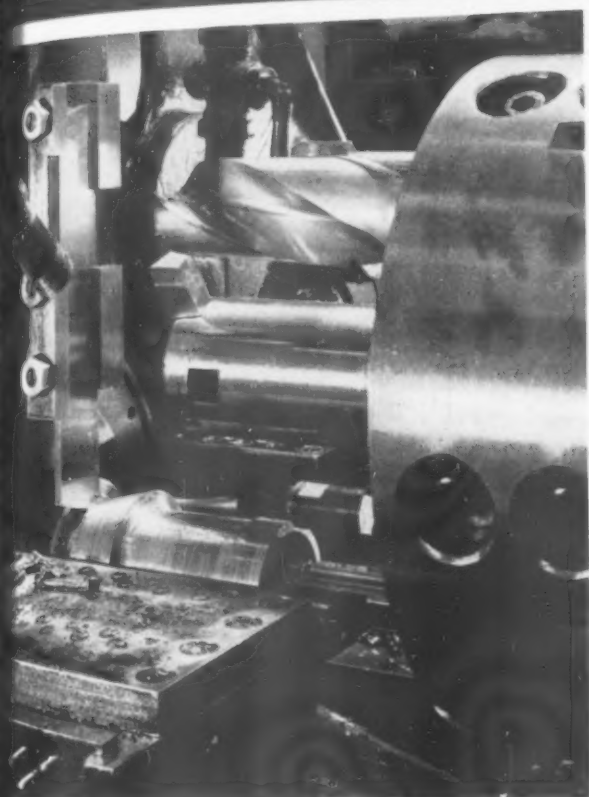
This refrigeration system is designed to maintain a constant temperature of 60 degrees during the entire period of grinding. It utilizes a York self-contained cold well water cooler.

Prior to its installation, the McCrosky Corporation, which uses the system on two Thompson surface grinders, found that the coolant oil would rise from 80 degrees to approximately 150 degrees within one to two hours and making it necessary to suspend operations until it cooled.

(Continued on page 128)

THE TOOL ENGINEER

Sets Up Quickly Runs Profitably on CLEVELAND AUTOMATICS with UNIVERSAL CAMMING



THE job shown in work in the photograph at left was processed on a Cleveland *Single Spindle Automatic*. The savings made, in cost and in production time are typical of savings anyone concerned with production wants to make, so give a moment's consideration to this case history . . .

Stock . . . 6½ inch bar, 4160 steel, hot finish.

Operations . . . Gauge, rough drill, rough turn O.D. in two stages, form O.D. complete, rough bore, finish bore, ream and cut off. Finish length 9⅞ inches. Length of body (formed with one tool) 6½ inches.

This Job Was Set Up Quickly . . . because every operation on a Cleveland Automatic is controlled by standard cams, easily reached and quickly set to any position with the aid of an exclusively Cleveland universal adjustment feature. All control settings are simplified by quick-reading calibrations which reduce original set-up time to a remarkable minimum, also make it possible to retool accurately for a re-run.

Ran Profitably . . . because one Cleveland accomplished what two machines and operators had formerly done, resulting in a saving of more than 62 per cent. This is typical of Cleveland Automatic economies.

That is why, with production men, Clevelands have a reputation for two important advantages . . .

- • 1. Maximum sustained production on long runs, with minimum down time for adjustments . . .
- • 2. Profitable economy on small-lot, short-run jobs.

Just Remember.. "CLEVELANDS CUT COSTS"

THE CLEVELAND AUTOMATIC MACHINE COMPANY

CLEVELAND, OHIO

SALES OFFICES



CHICAGO: 20 North Wacker Drive, Civic Opera Bldg., Room 1408

DETROIT: 540 New Center Building

★ ★ ★

NEWARK: 902 American Insurance Bldg.

CINCINNATI: 1315 American Bldg.

INDUSTRY

SAYS "TOPS"



**MANY FEATURES COMBINE
TO MAKE THIS**

PIONEER

MODEL VBD

AN OUTSTANDING PUMP

Provided with three pipe tapped outlets (right, left, and back into coolant sump), this Pioneer Pump model offers you great flexibility. It reduces your stock inventory; you don't have to carry a variety of pump models to satisfy the need for different outlets. One model is all you require.

This model will pump liquids usually considered difficult to handle, such as abrasives, etc.

The unit is designed to assure safe operation of motor; liquid cannot affect it.

These are a few of the high spots that distinguish the Model VBD—real efficiency from top to bottom of its streamlined body.

Pioneer Pump & Manufacturing Company
19645 John R Street, Detroit 3, Michigan



INDUSTRIAL NEWS DIGEST
(Continued from page 126)

INDUSTRIAL BUSINESS NOTES

INDUSTRY REPORTS

● News of expansions, purchases and new services

PURCHASE: Suprex Company, Ferndale, Michigan, manufacturers of precision gages, ground thread taps and form tools, by N. A. Woodworth Company, nationally known precision machine parts manufacturer.

Management, production personnel and equipment of Suprex, formerly a Michigan partnership of the Woodworth family, are being united with the



N. A. Woodworth, president, N. A. Woodworth Company, announces the acquisition of Suprex Company, gage, tap and tool producer.

Woodworth Company to consolidate for greater war production and to prepare for a post war program, the company has announced.

Woodworth now has 10 plants producing precision gages, ground thread taps, form tools, precision machined parts, heat treating and plating. Several products, described by executives as revolutionary, will soon be introduced to the gaging and production tool fields.

N. A. Woodworth founded the Excel-O Corporation in 1919, retired in 1937, but returned to the industrial field in 1939, an announcement states.

L. C. Smith converts: Changing ordnance requirements has enabled L. C. Smith and Corona Company to jump the field in converting to normal manufacture. Today, the Syracuse, New York, concern is again producing typewriters. Completion of a contract for a modified Army "Springfield" rifle, and increased output elsewhere of the new Garand, has permitted the swing back to the peacetime product. Though the typewriters to be made are for the armed forces, the company's advantageous position when civilian sales are ok'ed is obvious.

West Coast tools: Described as illus-
(Continued on page 130)



CHICAGO MOUNTED WHEELS—The first small wheels ever mounted on stationary shanks, they have maintained their supremacy through the years. Over 300 sizes, styles and grains—one to suit every job. They're tough, long lived, dependable.

CHICAGO GRINDING WHEELS—To break production bottlenecks due to the crying need for small wheels, we gave up making all larger sizes for the duration—with full WPB approval—and now specialize on sizes 3" in diameter and under.

America's Unbeatables

Yes, all the wheels in our line are small, but powerful and *swift tools of war* doing their stuff day in and day out — making it possible to speed through everything that requires precision internal or external grinding, polishing and burring — bombsights, planes, tanks, guns, intricate instruments, etc.

PROMPT DELIVERY—Come to America's Headquarters for Small Wheels, custom built to your order. No waiting for shipments now, and after the war a reliable source of supply. Our central location is another asset—cuts shipping time to most plants.

Send the Coupon for Illustrated Catalog

CHICAGO WHEEL & MFG. CO.

1101 W. Monroe St., Dept. TE, Chicago 7, Ill.

TEST WHEEL FREE—

So that you will know what Chicago Wheels can do, we'll gladly send one without charge. Tell us material you want to grind and size wheel you'd like.

• Half a century of specialization has established our reputation as the Small Wheel People of the Abrasive Industry.

Send catalog. Interested in ☐ Mounted Wheels

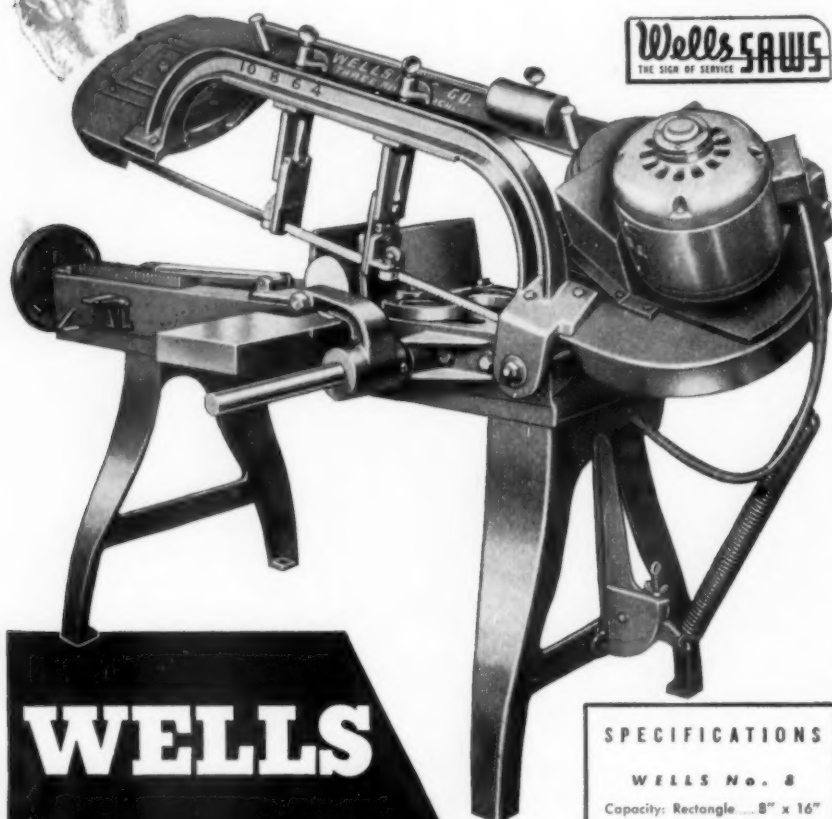
☐ Grinding Wheels ☐ Send Test Wheel. Size.....

Name.....

Address.....



WARTIME, PEACETIME—KEEP 'EM CUTTING *The Wells Way!*



WELLS
No. 8

SPECIFICATIONS

WELLS No. 8

Capacity: Rectangle.....8" x 16"
(spec. bowed guides).....5" x 24"
Rounds.....8" dia.
Speeds: ft. per min. 60, 90, 130
Motor.....Specifications optional

WELLS No. 5

Capacity: Rectangle.....5" x 10"
(spec bowed guides).....
Rounds.....5" dia.
Speeds: ft. per min. 60, 90, 130
Motor.....Specifications optional

**THE SAW WITH THOUSANDS
OF FRIENDS IN INDUSTRY!**

A fast and accurate metal cut-off saw able to handle most all types of metals in various shapes and forms as applied to industry. It wanted a versatile, simple unit for odd jobs or production work. The Wells No. 8 was the answer — and that is why so many plants, large and small, have Wells Saws.

Today's war production program and tomorrow's peace-time competition will emphasize the advantages Wells Engineers have built into their products. If you have metal cutting problems look for the answer in a Wells. Call your distributor or write direct.

Wells Has Established Leadership

*Wells Has
Established
Leadership*

WELLS MANUFACTURING CORPORATION
Wells METAL CUTTING
BAND SAWS
1212 MONROE ST. • THREE RIVERS, MICHIGAN

INDUSTRIAL NEWS DIGEST

(Continued from page 129)

trating the increasingly important position of west coast designers and manufacturers in the machine tool field, The Robert H. Clark Company, Los Angeles, has completed a new plant. Facilities provide for increasing the production of the concern's adjustable cutting tools and automatic tapping machine conversion unit.

Western Electric: Peacetime manufacturer of telephone equipment, The Western Electric Company has leased 200,000 square feet of floor space in Lincoln, Nebraska, for war production. Products: Communication equipment for the armed forces. The new factory supplements others in Chicago, Kearny, New Jersey, and Baltimore.

Tool steels: The Peninsular Steel Company, Cleveland, will expand its activities in Ohio for the distribution of Graphitic Tool Steels produced by The Timken Roller Bearing Company. Added territory, it has been announced, will include Dayton and Cincinnati.

Norton promotion: New general sales manager of grinding wheels and abrasive grain for the Norton Company is Ralph M. Johnson. Headquartered at the Worcester plant, he will travel extensively, the company says.

Meehanite rights: To the Indian Hume Pipe Company, Wadala, India, has gone manufacturing rights for Meehanite Castings in that country. Announcement was made in the London office of the Meehanite Metal Corporation.

Westinghouse at work: Employment at Westinghouse Electric and Manufacturing Company now stands at an all-time high of more than 117,000 persons, A. W. Robertson, company chairman has pointed out. Approximately 10,000 of these employees were added last October when the Pittsburgh concern was assigned by the Navy to operate the Naval Ordnance Plant at Center Line, near Detroit.

The company's backlog of unfilled orders at the end of October amounted to \$976,101,000, compared with \$889,528,642 at the same date a year before. These figures prove that the production phase of the war is by no means finished, Robertson pointed out.

Purchase: The Asbestos Fibre Spinning Company, North Wales, Pennsylvania, by Green, Tweed and Company, New York, manufacturer of self-lubricating mechanical packings and mill supply specialties.

AVCO contract: Plant expansion today means only one thing: more government business. Following news of a factory expansion program, announcement was made of a new contract for a large number of hollow steel propeller blades to be produced by the American Propeller Corporation, Toledo.

The new job was revealed by William F. Wise, president of the propeller company and executive vice president of the parent Aviation Corporation.

(Concluded on page 132)



Official U. S. Army Signal Corps Photo

THERE'S A *New* HEAVY WEAPON ON THE CUTTING LINES, TOO—IT'S *Super DBL* HIGH SPEED STEEL

Available IN THESE FORMS

★ Hot Rolled and Forged Bars in all necessary sizes.

★ Ground Bars: rounds in sizes up to 3" dia.—polished, standard ground or rough ground finishes.

★ Hardened and Tempered Tool-Holder Bits in sizes from 3/16" to 1", packed in one or assorted sizes as needed. Also special sizes as may be required.

**NOTHING NEW TO LEARN
IN HEAT TREATMENT
OR SHOP HANDLING**

IN the M-12 Tank Destroyer, above, Army Ordnance has combined the great hitting power and range of the 155 mm gun with the speed and mobility of the medium tank chassis. The result is a weapon that not only can stop any enemy tank now or likely to be in the field, but can blast out land strong-points or sink a ship.

In similar fashion, Allegheny Ludlum technicians have added cobalt to the familiar AL-developed DBL low-tungsten moly analysis. The result, *Super DBL*, is a high speed steel of maximum red hardness for heavy duty work—a material that delivers top performance at the same time that it conserves strategic materials.

Super DBL has been thoroughly proved in service. Use it for your heavy roughing and "hogging"

jobs—it's suitable for anything from hard, gritty materials to tough, heat-treated alloy steels. • Full information is available in the "*Super DBL* Blue Sheet." Write for your copy, or for the assistance of our Mill Service Staff in selecting the proper grades of AL Tool Steels for your various production jobs.

ADDRESS DEPT. TE-20



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STEEL CORPORATION
BRACKENRIDGE, PENNSYLVANIA

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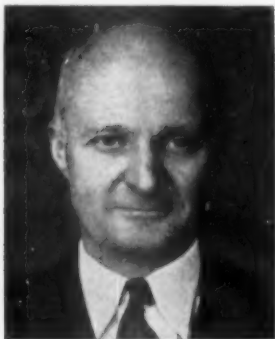
(Concluded from page 130)

MOTOR MEMOS

SAE debunks post-war dream car, scratches aluminum, plywood and plastics from the list of usable materials. WPB says "no" on plans for re-tooling

DETROIT—The industry's top crust, members of the Society of Automotive Engineers, assembled in this city January 10-14 for their War Engineering Annual Meeting.

Named new president of the Society was William S. James, chief engineer of The Studebaker Corporation. An SAE member since 1918, he succeeds Mac Short of Vega Aircraft as the organization's 39th leader.



Studebaker's W. S. James,
SAE President-Elect

On taking office, James pledged that the SAE would be ready for peace as it was for war. "We have laid plans," he said, "so as not to be unprepared for whatever changes we can foresee."

A long technical program included many subjects of downright interest to production men—new materials, cutting oils and fabricating methods. But all this took second place in news value at the meeting.

Post-war automobile design got top billing. The subject is not without considerable interest to production engineers, either, for they are the men who must find economical methods for producing such models.

Discounting possible consumer insistence for something really new in automobiles, they buried the post-war "dream car" at the meeting. The still-born brain-child of the so-called "air brush school" of design, astounding in streamlined transparency, air conditioning, luxurious appointments, and a \$400 price, was eulogized as a masterpiece of creative imagery, but as a manufacturing impossibility.

Selected by the SAE to serve as official dream debunker was Edgard C. De Smet, executive engineer of Willys-Overland, who proceeded to lambaste the artist designers for deluding the public about the car to expect when war ends.

Reduced to bare essentials, here is the gist of SAE opinion as presented by DeSmet:

Aluminum cannot compete with steel

on the basis of cost. The physical limitations of the light metal would require that curves and contours be minimized and parts simplified by eliminating sharp corners and complex flanges. Spot welding on aluminum is much slower than on steel, and bumping out body and fender dents would require entirely new methods and new equipment in every garage in the nation.

Despite currently sensational applications of plywood in aircraft production, the engineer from Toledo pointed out that "so far no one has been able to stretch wood. This means that practical forming... is confined to single-curvature surfaces, limiting designers as well as manufacturers to very simple formations and shapes. Plywood is at a very distinct disadvantage in man hours and cost."

Ford engineers winced when they thought of conveying to plastic-minded Henry Ford SAE opinion of the motor mentor's favorite material. "The fact is," De Smet said, "that the one-piece all-plastic body is definitely out of the question, since it has been established that the production of masses of plastic material is only acceptable when confined to small, non-functional, and non-operative parts. Most common disadvantages are brittleness, distortion and excessive cost."

The Willys executive ended his remarks with an excellent sales talk for 1942 models: that adjustment to peacetime production would be a trying period at best, dangerously near disorganization and confusion, and recommended that the motoring public forget dream cars and prepare to buy good, practical, conservative motor vehicles.

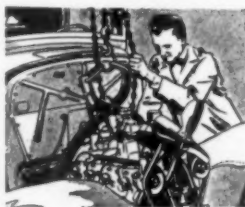
Almost before attending members and industry big wigs had completed their yawns, Detroit's colorful William B. Stout was on his feet. What Bill told his colleagues made their ears burn.

"If the automobile industry," he snapped, "is going to continue in the transportation business, it must undertake more research than ever before.... Airplane design has moved transportation as far ahead of present automobiles as autos moved it ahead of the railroads!"

● **Production records:** Publicity-conscious motor makers are not letting Johnny Q Public forget about the war production jobs they are accomplishing. After all, as many a salesman will admit, the name sometimes sells the product.

Here are a few news notes individual companies hoped post-war car buyers read last month:

Chevrolet has superimposed on heavy truck production in its St. Louis



plant the manufacture of sea-going "ducks". The latter is a fighting unit which is essentially a six-wheel truck assembled into a heavy hull for amphibious operations.... Ford's spectacular Rouge plant at Dearborn has produced and delivered to the Army more than 20,000 Pratt & Whitney radial engines.

Down in South Bend, Studebaker announced to prospective buyers that last year the mighty-midget of motor-dom produced three and one-half times as many Wright Cyclone engines as it did in 1942. Total production for the year, the company said, was 22,925 units, bringing cumulative output by Studebaker to 29,016 engines.... Buick, too, had an aircraft engine story to tell. Since war started the big GM Division has turned out sufficient Pratt & Whitney engines to power more than 8,000 heavy bombers. Buick employment now totals 45,000.... The long-conservative Packard organization, now under the leadership of dynamic George Christopher, boasted of a 70 per cent increase in output of liquid-cooled engines last year. The gain was made with only a 60 per cent increase in billing to the government, it was said. Packard production of Rolls-Royce aircraft and Packard marine engines amounted to three and one-half times the work involved in the company's biggest car year.

● **When can we start?** That is the question motor makers, anxious to commence retooling, have been asking Washington. Aided by the best industry publicity force in existence, the big three, along with Nash and Packard, have turned to the car-starved public for backing in their demand that WPB permit production men to commence the rearrangement of their shops for automobile manufacture whenever such work will not interfere with war production.

Late last month the industry got an answer that stopped its demands—temporarily at least. John H. Middlekamp, new chief of the WPB's automotive division, pointing to the 1944 truck and aircraft programs, said firmly, "That comes first. How can we even think of cars?"

Hopeful motor makers knew that this answer had come from higher up.

—WALLACE SCOTTEN

—MACHINE TOOLS—

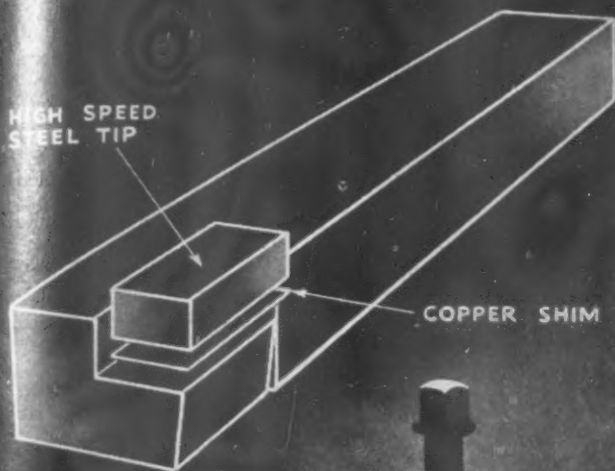
(Continued from page 110)

the builders generally agree with this figure. They say that it is not only conservative, but based on sound reasoning and judgment. Nonetheless, the industry is not altogether happy.

If a \$375,000,000 annual volume had been predicted for any year before the war, the cheering could have been heard from the mid-west to New England. But this year it is different. As business levels off to the \$375,000,000 figure, each builder must take on more direct war work—mostly subcontracts—to keep his war-expanded plants anywhere near full operation.

Thus, having sweated through an initial struggle with renegotiation from

(Concluded on page 134)



Simple method of applying high speed tips

Information supplied by an Industrial Publication

Copper brazing offers a readily available means of mounting high speed steel tips on low alloy shanks for cutting tools.

The procedure is quite simple. A recess milled in the shank is thoroughly cleaned and coated with brazing flux. The flux is also applied to the high speed steel tip. A copper shim (0.003 to 0.005 in. thick) is cut to the size of the recess.

The shank is heated until the flux flows freely before the shim is fitted in the recess. After the shim and tip are put in place, the assembly is brought up to 1650° F., in a preheating furnace.

Then the assembly is transferred to a high heat furnace and held at quenching temperature (2200-2350° F.) until the tip is soaked through. Copper melts at 1980° F., therefore the shim will melt and spread over the interfaces, forming a firm bond.

After withdrawal from the furnace the tip is aligned and pressed into place to squeeze out excess copper and flux. As soon as the tip is well bonded to the shank, that end is oil quenched. Final operation consists of the usual high speed steel temper at 1000-1050° F.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

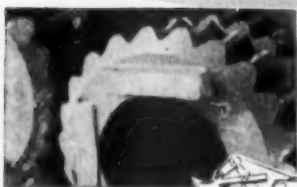


MOLYBDIC OXIDE, BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

Climax Molybdenum Company
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**Let an Ampco Field Engineer
help you design for
extra Dependability,
Durability, and Service
— in your post-war products**



in Heavy Machinery

... standard equipment with leading makers of steel mills, sugar mills, excavators, etc.



in Aircraft

... specified at critical points in practically every type and make of plane now flying.



in Machine Tools

... over 90 leading machine-tool builders regularly use Ampco Metal.

... in Many Other Fields

with parts of Ampco Metal

Ampco's nation-wide field organization of metallurgical specialists is at your service — to help you with engineered applications of this superior alloy of the aluminum bronze class. Ampco's remarkable performance in war service is bringing home the outstanding value of this unique metal. Ampco Metal is constantly demonstrating its ability to "stand up and take it" under conditions where ordinary bronzes fail. Ampco's longer life in your service means the elimination of costly breakdowns. Ampco's broad facilities and wide experience enable you to utilize Ampco Metal in many forms. Regardless of what your bronze problem may be, *we can help you!*

Write today for further information.

A-1



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AMPCO METAL, INC.
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Please send Catalog 23, and File
41 of Engineering Data Sheets.

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Address.....
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— MACHINE TOOLS — (Concluded from page 32)

the standpoint of a saturated post-war machine tool market, the industry must dive from the frying pan into the fire. As it takes on the production of more military matériel it faces increasingly complicated problems of contract termination.

Fortunately, the industry is well organized. A large segment of the builders, through their tough, conservative National Machine Tool Builders Association, has been unusually vocal in awakening the public, Congress and government agencies to their specific problems.

Single handed, the Association stirred many Congressmen into the realization that an industry cannot glut the market with a 10-year supply of its product and hope to survive the post-war period without reasonable cash reserves. Having driven home this point, the Association now is active in Washington on the problem of contract cancellation.

Also, the Association is at work on the problem of excess machine tool disposal. In the near future, it is expected, a concrete plan proposed by the builders will be announced. A committee of builders has laid this plan before representatives of the various branches of the armed forces studying the problem, as well as the combined panel on machine tool disposal headed by M. R. Johnson of the Defense Plant Corporation.

The builders themselves, it has been learned, do not expect many war-built machines to be shipped abroad after European hostilities have ended. A lot of day-dreaming is being done, they say, about the possible economic conditions of Europe when the Allied squeeze on Germany is completed.

Instead, it is believed builders will soon propose that every usable machine tool in defense plants here be sold at a figure sufficiently high to keep them out of the speculation market and low enough to interest American metal working industries that can see the advantage of replacing worn out equipment with more modern machines.

Since many DPC-owned machine tools have suffered from abuse in the hands of unskilled war workers, the builders look for a substantial volume of work rehabilitating their own machines for concerns that might buy them from the government. Most of the builders, it has been said, do not believe such work will amount to a large portion of their annual business immediately after the war.

While the post-war market picture painted by the Machine Tool Builders Association in fighting renegotiation admittedly was dark, many builders seem to have an innate faith in their own ability to find a market with an improved product. Indicative, however, of how concerned many of them are about this post-war market is the significance they attach to news of possible automobile production during 1944, and especially the machine tool buying plans announced by the motor makers.

If it indicates anything, their reaction to such news suggests that they view Detroit as the largest single potential machine tool market when American industry really swings into reconversion.

THE END

THE TOOL ENGINEER

He looked through this Disc and found the Answer . . .

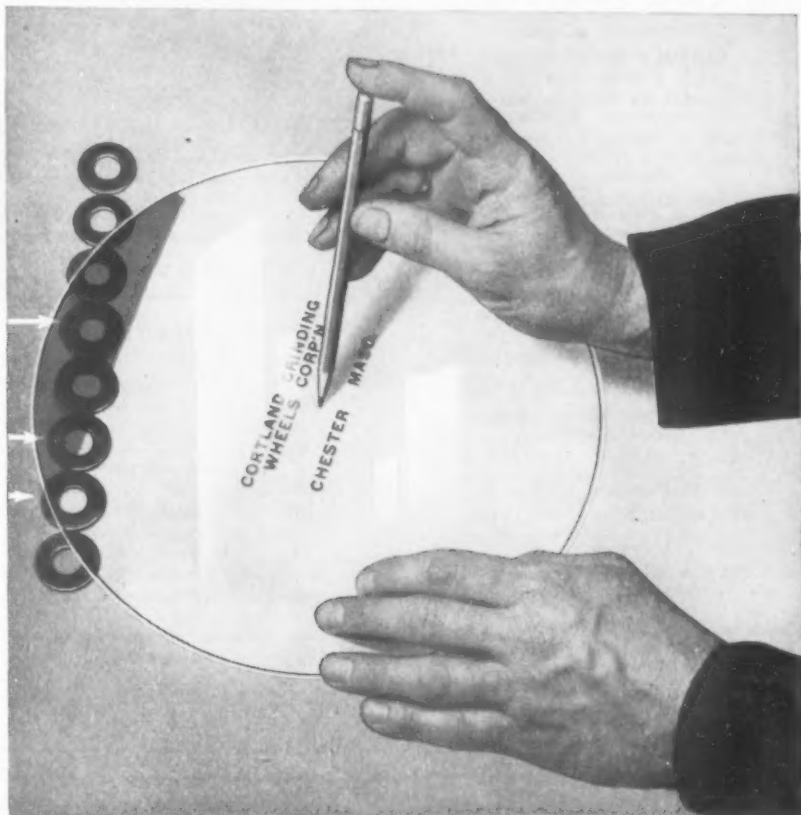


He was a harassed manufacturer, in the midst of renegotiation. Not a particularly good time to call and try to talk about grinding wheels . . .

"Grinding Wheels? Hell — I need *lapping* compounds! Look at these specifications: S.A.E. 52100 — 63-65 Rockwell C scale — *surface finish 2 micros* — and production's gotta be stepped up! . . . What's that thing?"

"Just a piece of clear plastic. It represents the segments in your vertical spindle grinders. Now imagine that these washers are the work on your tables. Would you mind rotating this disc counter-clockwise . . . slowly . . . ? See how the narrow end of the Cortland Segment starts to pass over the work? Shock and resistance minimized; large surface still exposed to coolant . . .

"Keep going . . . 2 Watch the action of the straight inner edge of the segment — See how it travels *diagonally* over the work? We call it *Diagonal Shearing* — with varying contact it *shaves* off the metal . . .



"Keep going . . . 3 Now the segment is in full surface contact with the work. Maximum heat is generated, but only momentarily, because as the segment continues to pass across the work, more

and more of the ground surface is again exposed to the action of the coolant.

"That's the story back of the success of Cortland Chucks & Segments — *Diagonal Shearing* with varying contact — for better, faster cutting; minimum shock; maximum area exposed to coolant; and ground material swept aside. Better surface grinding, less segment wear, less power needed, lower overhead and maintenance . . . All good answers, don't you think?"

★ ★ ★

• . . the Answer to a problem in Surface Grinding. The problem may involve a Profilometer reading of 2 microinches; or hardened steel parts that heat and squeal; or table loads that take too long to grind or require too much amperage, or need too many segment dressings. . . You'll find these problems *solved* — and many more in the true case histories presented in the Cortland Chuck & Segment Bulletin. For a free copy write on your letterhead to

Cortland Grinding Wheels Corporation
14 Cortland Street, Chester, Massachusetts



CORTLAND

Chucks and Segments

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AMERICAN CYSTOSCOPE MAKERS, INC.
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CHARLES D. BRIDDELL, INC.
Crisfield Plant
Crisfield, Maryland

CRIBBEN & SEXTON COMPANY
Chicago, Illinois

CROWN IRON WORKS
Minneapolis, Minnesota

W. S. DARLEY & COMPANY
Chippewa Falls and Chicago Ave. Plant
Chicago, Illinois

E. I. DU PONT DE NEMOURS & COMPANY, INC.
Webash River Ordnance Works
Newport, Indiana

ELECTROLUX CORPORATION
Old Greenwich, Connecticut

ELGIN NATIONAL WATCH COMPANY
Jewel Bearing Division, Plant No. 3
Aurora, Illinois

THE GENERAL FIREPROOFING COMPANY
Main Plant
Youngstown, Ohio

GENERAL IRON WORKS COMPANY
Denver, Colorado

GENERAL MOTORS CORPORATION
Chevrolet-Commercial Body Division
Indianapolis, Indiana

GENERAL MOTORS CORPORATION
Delco Radio Division
Kokomo, Indiana

GENERAL MOTORS CORPORATION
Oldsmobile Division
Janesville Plant
Janesville, Wisconsin

GLOBE UNION, INC.
Milwaukee Plant
Milwaukee, Wis.

GRAPHO PRODUCTS, INC.
Shell Plant
Indianapolis, Indiana



INTERNATIONAL SILVER COMPANY
Factory "E"
Meriden, Connecticut

KEN-RAD TUBE & LAMP CORPORATION
Owensboro Plant
Owensboro, Kentucky

KENNEDY VAN-SAUM MFG. & ENGINEERING
CO.
Danville, Pennsylvania

LATTIMER-STEVENS COMPANY
Columbus, Ohio

LIGGETT SPRING & AXLE COMPANY
Monongahela, Pennsylvania

LOGANSFORD MACHINE, INC.
Logansport, Indiana

GLENN L. MARTIN — NEBRASKA COMPANY
Fort Crook Reservation
Omaha, Nebraska

LOUIS MARX & COMPANY
Girard Manufacturing Company
Girard, Pennsylvania

MINNESOTA FIRE EQUIPMENT COMPANY
Lindstrom, Minnesota

THE OHIO BRASS COMPANY
Mansfield Plant
Mansfield, Ohio

OUTBOARD, MARINE & MFG. CO.
Evinrude Motors
Milwaukee, Wisconsin

OUTBOARD, MARINE & MFG. CO.
Gale Products Company
Galesburg, Illinois

OWENS-ILLINOIS CAN COMPANY
Baltimore Plant
Baltimore, Maryland

THE PFAUDLER COMPANY
Rochester, New York

REVERE COPPER & BRASS, INC.
Rome Manufacturing Division
Rome, New York

SYLVANIA ELECTRIC PRODUCTS, INC.
Montoursville Plant
Williamsport, Pennsylvania

UNITED STATES RUBBER COMPANY
Footwear Division
Naugatuck, Connecticut

UTAH RADIO PRODUCTS COMPANY
Chicago, Illinois

WENDT-SONIS COMPANY
Hannibal, Missouri

ALBERT WRIGHT
Oakland, California

CIVILIAN CITATIONS

•WASHINGTON — The Army-Navy "E" Award, wartime equivalent of the military citation, has been awarded to 5,664,000 workers in the United States.

At last count, the coveted burgee now flies over 2,415 war plants. These figures were obtained directly from the War and Navy Departments.

The War Department states its awards have gone to 1,590 plants employing 3,864,000 workers up to last December 1. The Navy Department, after allowing for duplications with Army presentations, said its figures up to the same date showed awards to 825 plants employing 1,800,000 workers.



Made To Fit Any Machine

Furnished with male or female taper, straight, threaded or special shanks to fit any machine used for tapping or reaming.

WRITE FOR
CATALOG

How TO OVERCOME SPINDLE MISALIGNMENT!

—and Simplify Tapping and Reaming

The easiest way of overcoming misalignment between the spindle and the work, in tapping and reaming, is to use a tool holder so designed that it compensates for such inaccuracies, even though they amount to as much as 1/32 of an inch.

This is what the Ziegler Tool Holder does! And because it does it automatically, it greatly simplifies tapping and reaming, reducing spoilage losses from oversize and bell-mouthed holes, and also reducing set-up time. Try it and see how it will increase your production rate and at the same time enable you to turn out work that meets the highest standards of precision.

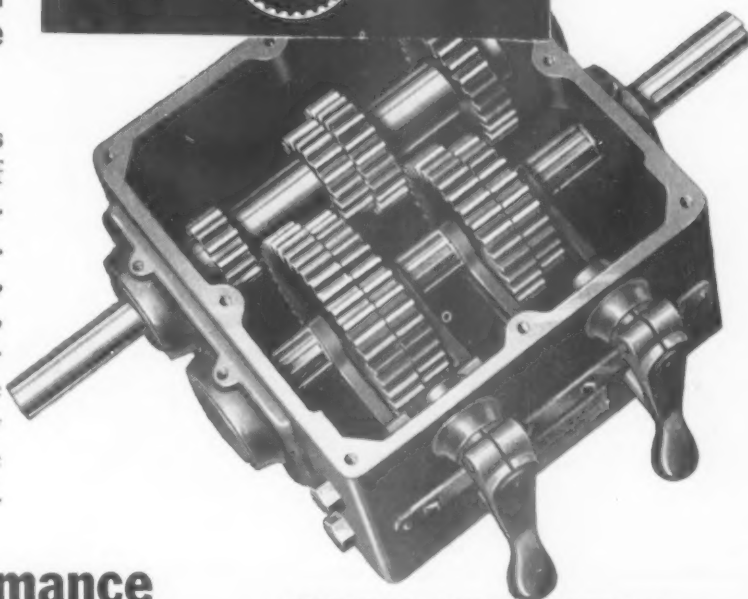
Ziegler
ROLLER
DRIVE
FLOATING HOLDER
for Taps and Reamers...

W. M. Ziegler Tool Co.
1920 Twelfth St.
Detroit, Mich.

TRIPLE THREAT Production Star

- 1 No belts to shift. Drives to large step of cone at all speeds.
- 2 Eliminates overhead line and counter shafts.
- 3 All advantages of geared head with belt drive smoothness.

It's helping to bring schedules through on time in hundreds of plants. Increases production capacity 25% to 300%. Saves time. Slashes costs. For lathes, shapers, milling machines, turret lathes, radial drills, boring mills, hobbing machines, Browne & Sharpe and Cleveland Automatic Screw Machines and other tools. See your dealer or write for details.

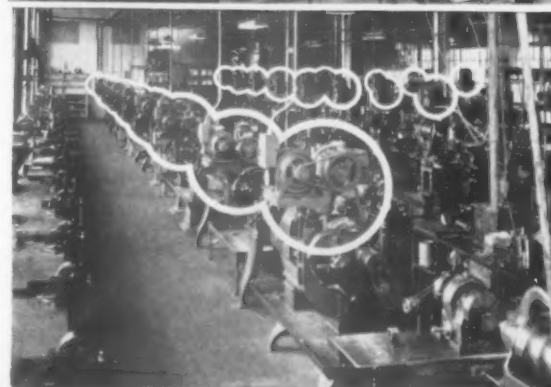
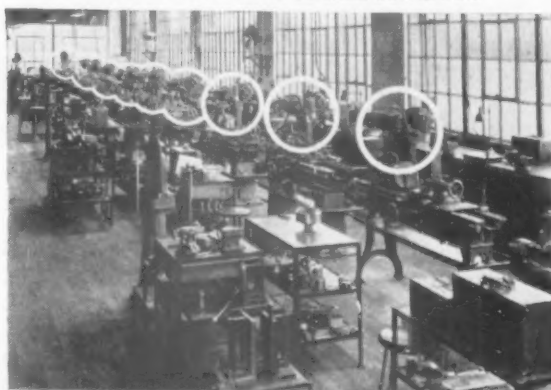


Outstanding Performance for These Users:

American Brake Shoe & F. Co.
Kellogg Division
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Bendix Aviation Corp.
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Pacific R. R. Co.
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Div. General Motors
Doehler Die Casting Co.
Electric Auto-Life Co.
Frankfort Arsenal

Frisco Lines
Holtzer-Cabot Elect. Co.
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International Projector Co.
Kohler Corp.
Monsanto Chemical Co.
The New York Air Brake Co.
Ohio Pattern and Fdry. Co.
Oneida, Ltd.
Parker Appliance Co.
Republic Steel Corporation
Revere Copper and Brass, Inc.
SKF Industries
The Timken-Detroit Axle Co.
The Todd Company
Wagner Electric Co.
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TYPICAL INSTALLATIONS



THE TURNER UNI-DRIVE COMPANY

(Sales Division Turner Machinery Co.)

3416 Terrace St.

Kansas City, Mo.

NOW AT WORK FOR VICTORY ***

PRODUCING MACHINE TOOL DRIVES • ORDNANCE TOOLS • AIRCRAFT FITTINGS

C-F POSITIONERS

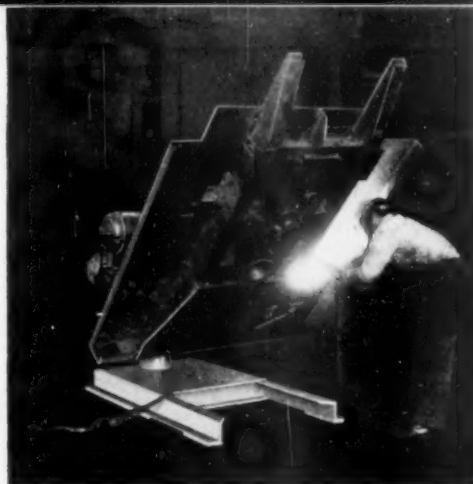
**Safety, Economy,
Speed -- PLUS
Better Welding!**

A weldment can be no stronger than its weakest weld — and "down-hand" welding is your best assurance of strong flawless welds. That's why "positioned welded" is so frequently specified today!

C-F Positioners eliminate crews with slings and chains, clear your floor space, reduce accidents and make every weld a faster, better weld! The 135° beyond horizontal tilting feature of C-F Positioners combined with 360° table turn assures the proper welding position in even the most inaccessible corners!

Adaptable tool! Heat treating, cutting, large pipe and boiler-handling problems and jobs where a continuous turn is necessary, are easily answered with a C-F Positioner. You'll find new uses! Many sizes and true-rated capacities. Hand or power operated. Write for catalog showing sizes, installations and many uses.

Write for Bulletin WP22



CULLEN-FRIESTEDT CO.

1318 S. Kilbourn Ave.
Chicago 23, U.S.A.

**10 parts of wear-resisting Ampco Metal
on the Lodge & Shipley Duomatic
... to guard against costly failures**

Like many other leading makes of machine tools—including the products of over 90 manufacturers—the Lodge & Shipley No. 3A Duomatic Lathe contains many parts of Ampco Metal at points where stubborn resistance to wear is imperative. • Check for parts

of Ampco Metal, as a mark of quality in the machines you buy.

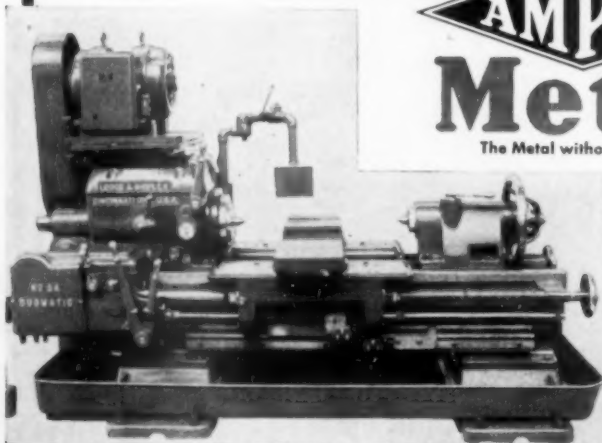
Write for bulletins.

Ampco Metal, Inc.

Dept. TE-2 Milwaukee 4, Wis.
M-2B



The Metal without an Equal



For replacements

When bronze parts fail, it pays to replace them with Ampco Metal, which lasts several times as long as ordinary bronze. Ask nearest Ampco Field Engineer for suggested Ampco Metal stock list to fit the specific needs of your Maintenance Department.

**DEPEND ON
DUBLIFE**

**GAGES
FOR THAT $\pm .00002$ IN.!**



The DUBLIFE reason! You have a brand new gage in your hand even after long use.

**DUBLIFE
REVERSIBLE
PLUG GAGES**



DUBLIFE means certainty. No hesitation nor delay. Both "Go" and "No Go" plugs in same handle are reversible. When either plug shows even the shadow of wear turn end for end—and you have a new gage.



Beautiful products of the most modern metalcraft, with United Precision's exclusive UPPCO-Lapped finish. Handsome hexagon handle. Bronze split collet securely locks plugs.

Originators and exclusive manufacturers of DUBLIFE Gages and UPPCO-Lapped Finish.

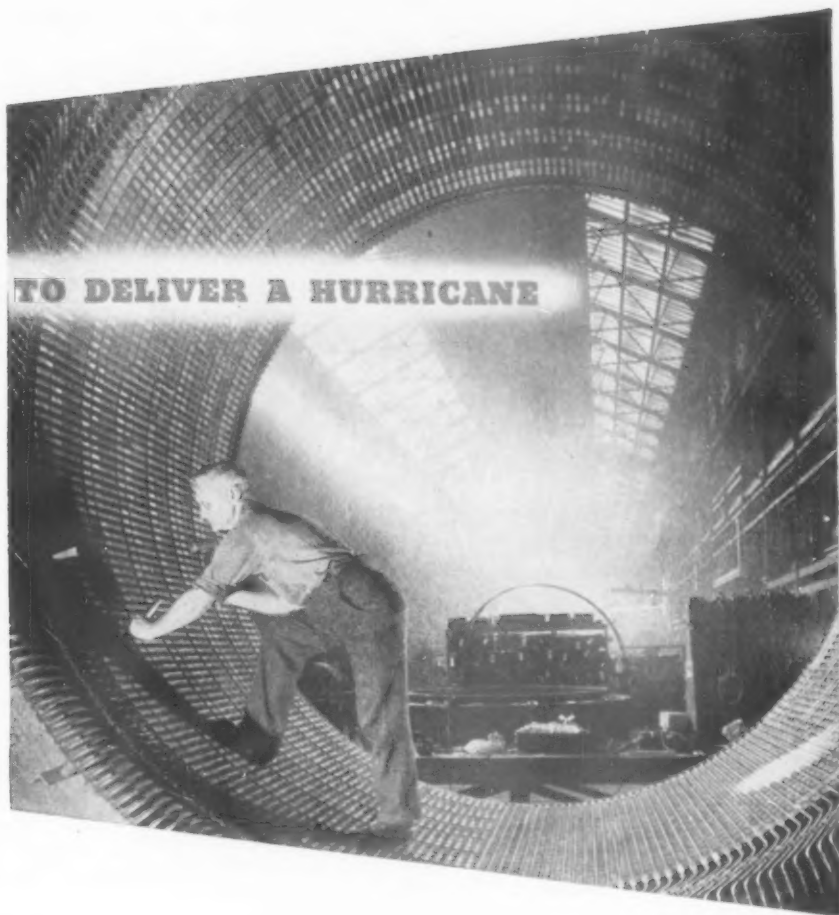
Send for Complete Catalog of
DUBLIFE Line

Also shows other gages of A.G. Design.
Wire or write

**UNITED PRECISION
PRODUCTS COMPANY**

3517 W. Belmont Ave.
Chicago 18, Ill.

BUILDING A MOTOR TO DELIVER A HURRICANE

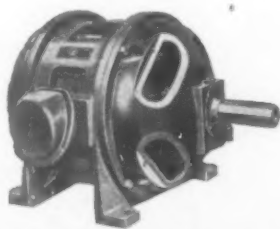


Driving a 400 mile-an-hour super-hurricane through a plane-testing tunnel takes plenty of horsepower . . . more than anybody had ever packed into a wound-rotor induction motor before. To do it, Westinghouse designed and built the world's largest. Its 40,000 horsepower spins two 16-blade fans standing nearly 40 feet high—weighing 197 tons. The motor itself weighs 125 tons, stands 15 feet high and you could drive a small truck through the stator you see above. Cooling it takes 85,000 cubic feet of air per minute.

This is just another example of Westinghouse ability to build motors—motors designed to do specific jobs. It's the kind of engineering skill back of every Westinghouse motor you buy—special or standard.

For war work or postwar reconversion, take full advantage of this ready-to-use experience. You'll solve your drive problem quicker and know the motor will fit the job—whether it is a fractional or 40,000 horsepower. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

J-21294

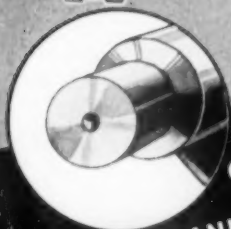


This is only one of the many Westinghouse general purpose motors available in standard and special enclosures. Features include choice of sealed sleeve or ball bearings; Tuffernell insulation; Balanced rotor; rigid one-piece frame; die-cast rotor; radio-frequency tested insulation.

Westinghouse Motors

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE





COUNTERSINKING
CRANKSHAFTS

**CIRCLE-R COMBINATION
CENTER DRILLS WERE**
"Made to Order"
For This Operation



These drills are coping with one of the toughest crankshaft production jobs in the automotive industry. In this capacity a smaller size combined drill and counter-sink is used for spotting, followed up with a larger size drill.



CIRCLE-R CENTER REAMERS are helping to boost production in the airplane industry where they are used for countersinking of rivet holes. Circular Tool furnishes the majority of reamers used for this purpose.

Send today for Circular Catalog — K

CIRCULAR TOOL CO., INC.
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LOS ANGELES • ROCHESTER • INDIANAPOLIS • DETROIT

CHICAGO • PHILADELPHIA • NEW YORK • DAYTON

CLEVELAND • ST. LOUIS



*Feminine
Touch*
**Controls
Molding Machines**



equipped with

NOPAK Air Cylinders

On the Tabor Power Squeeze, Flask Lift Molding Machine, a NOPAK Model E 4½" Air Cylinder moves the 350 lb. head into position for the squeeze, then moves it back so the finished mold can be removed, and a new flask inserted.

Eliminating strenuous manual effort from this particular machine movement has made it possible to employ women on these machines . . . has speeded up the molding cycle to meet war production needs. A battery of these machines is production-molding piston rings for airplanes in a large, well-known foundry. Perhaps NOPAK Cylinder Power can help you speed up movements on your machines. Write for Bulletin 82-A.

GALLAND-HENNING MFG. CO.
2757 S. 31st STREET MILWAUKEE 7, WIS.



NOPAK Jolt-Squeeze Valves are standard equipment on many molding machines, and may be used in the control of other types of machine movements. See Bulletin 86.

NOPAK Representatives in Principal Cities
VALVES and CYLINDERS
DESIGNED for AIR or HYDRAULIC SERVICE

This improved cutting oil

gives longer tool life

and better finishes on nonferrous metals —



**GULF
CUT-AID**

This revolutionary Gulf Cutting Oil is setting new standards of machine tool performance in hundreds of plants

Gulf Cut-Aid consistently shows better results in cutting aluminum and other nonferrous metals!

Here's a typical case:

Operation—machining forged aluminum fuse bodies for high explosive shells.

Result with Gulf Cut-Aid—increased production, longer tool life, and much better finish.

In addition to its superior performance in cutting nonferrous metals, Gulf Cut-Aid has another important function—it is an effective energizer for other cutting oils, regardless of type or viscosity.

Blended in varying proportions depending upon the various requirements of the job, the use of Gulf Cut-Aid with other cutting oils makes possible higher production speeds and results in improved finish, longer tool life, or both.

Call in a Gulf Service Engineer today and let him show you how Gulf Cut-Aid and other Gulf quality cutting oils can help improve your machining practice.

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GULF REFINING COMPANY**
GULF BUILDING, PITTSBURGH, PA.

Gulf Oil Corporation—Gulf Refining Company
3800 Gulf Building, Pittsburgh (30), Pa.

TE

Please send me, without obligation, a copy of the booklet, "Gulf Cutting Oils," which includes a 45-page Machining Guide.

Company.....

Name.....

Title.....

Address.....

**TOOLS ARE WEAPONS...
TREAT 'EM RIGHT**

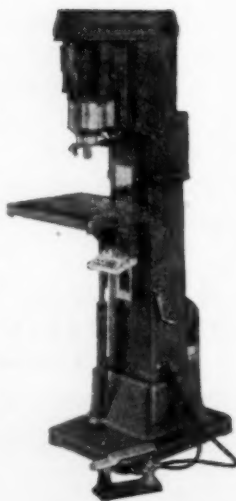




IT'S IN THE *Air!*

**AIR CONTROL is the Secret
of precision tapping
The Haskins Way**

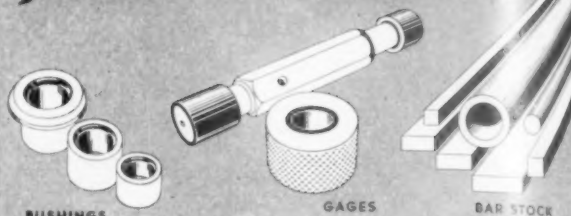
Accuracy—to a class 4 fit when necessary—is constant—each part is tapped exactly like every other, independent of operator efficiency. AIR regulates the complete tapping cycle—not only the down stroke, but its control is so sensitive that the tap is allowed, in effect, to float out of the part. Tap life is longer—tap breakage practically eliminated. Send today for your copy of catalog on Tapping—The Haskins Way. R. G. Haskins Co., 2756 W. Flournoy Street, Chicago, Illinois.



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PRECISION TAPPING EQUIPMENT

TALIDE-TIPPED for Production!



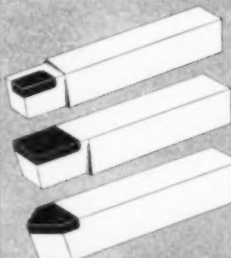
BUSHINGS

GAGES

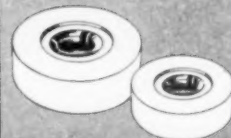
BAR STOCK



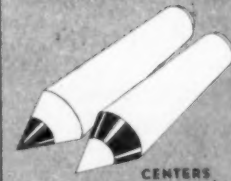
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BLADES



CUTTING TOOLS



DRAWING DIES



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TALIDE METAL

... is a superior grade of Tungsten Carbide—developed by us during the past twelve years and manufactured today by precision methods under rigid control. It has exceptional density, strength and hardness and is ideal for application at wear points on tools, machinery and equipment. Talide Metal bar stock is available in any size, diameter and length.

The use of Talide Metal in your plant will assure you of constant, uninterrupted production with the added advantages of ...

- ★ Longer Life
- ★ Increased Output
- ★ Maintained Size
- ★ Closer Tolerance
- ★ Fewer Rejects

Thousands of Talide-Tipped Tools, Dies and Wear Resistant Parts are shipped daily all over the country to Arsenals and War Plants producing cartridge cases, small arms ammunition, primer cups, airplanes, tanks, ships, rifles, machine guns and other war material.

TIPPED
WITH

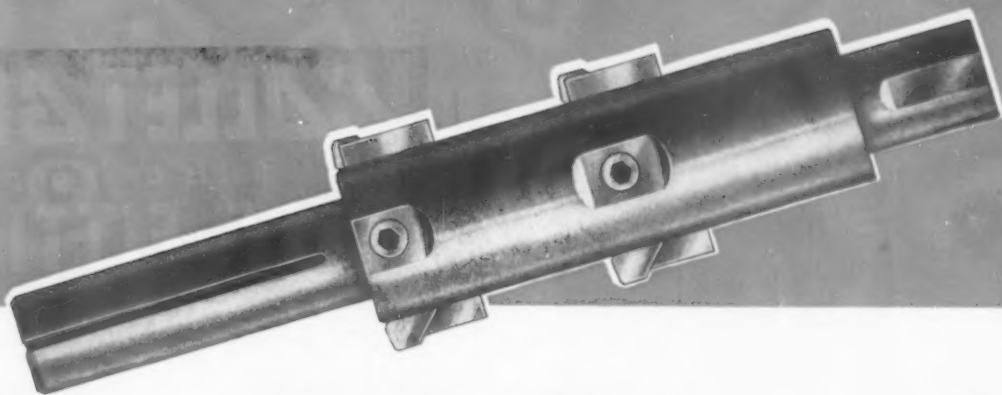


TUNGSTEN
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METAL CARBIDES CORPORATION

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TUNGSTEN CARBIDE TOOLS · DIES · WEAR PARTS



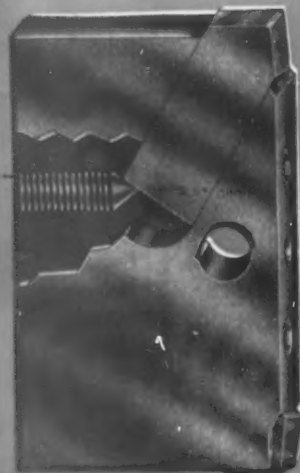
Tool for Final Victory with **DAVIS**

BLOCK TYPE TOOLS for Boring and Finish Reaming

Where precision work is an absolute necessity, DAVIS Boring Tools are the tried-and-proved answer. In war plants all over the United States, they have set amazing new standards for accuracy—speed—economy. If you have any kind of a boring problem, write us today.



DAVIS Regular Type Block
Full Details in Bulletin #301



The DAVIS Single Cutter Micrometer Block
Full Details in Bulletin #400



SECOMET DIAMOND WHEELS

When the war is won—Americans will enjoy higher standards of living than ever before. Motor cars, airplanes, trucks and tractors, home appliances, every machine and tool that's made of metal, will be better, safer and stronger. JKS Diamond Wheels will help to make this possible by processing tougher metals, with greater precision. Far-sighted companies are already designing new products, scanning new outlets and perfecting plans for cutting their costs with improved machine tools. To such executives this is an invitation to write today to—

J.K. SMIT & SONS
157 Chambers St., New York, N. Y. 6400 Tireman Ave., Detroit, Mich.

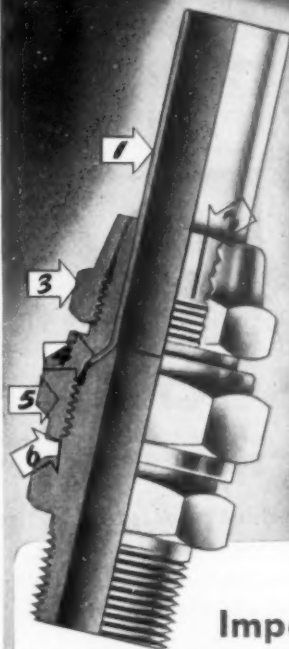
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COLLET GRIP

Seals as it grips

TUBE FITTINGS

NEED NO THREADING WELDING OR SOLDERING



1 Permit use of tubing in wide range of wall thicknesses.

2 SLOTTED collet insures uniform grip of tubing surface, protecting flare seal.

3 COMPRESSION NUT compresses Collet Nut to tube, forming permanent collet grip that cannot loosen.

4 DESIGN directs pulling stresses and vibration strains away from angle of flare.

5 COLLET NUT has long bearing surface which grips tube securely beyond the flare.

6 Easy to assemble and disassemble. Use repeatedly.

Impossible for Nut to Loosen Under Vibration!

Here is the quick, modern way to make tube connections that cannot work loose. "Collet Grip" fittings hold the tube securely over a long bearing surface, preventing vibration and shock from reaching the flare. Easily assembled or disassembled by tightening or loosening compression nut. "Collet Grip" design permits quick, easy installation of short lengths of tubing in close quarters. Used as standard equipment by leading machine tool and engine builders.

COTNER-WILKINSON COMPANY
Division of Logansport Machine Company, Inc.
LOGANSPORT, INDIANA



Fittings shown here are Double Nut design; also made in Single Nut design, simplified for close work. Each design in 5 standard shapes.

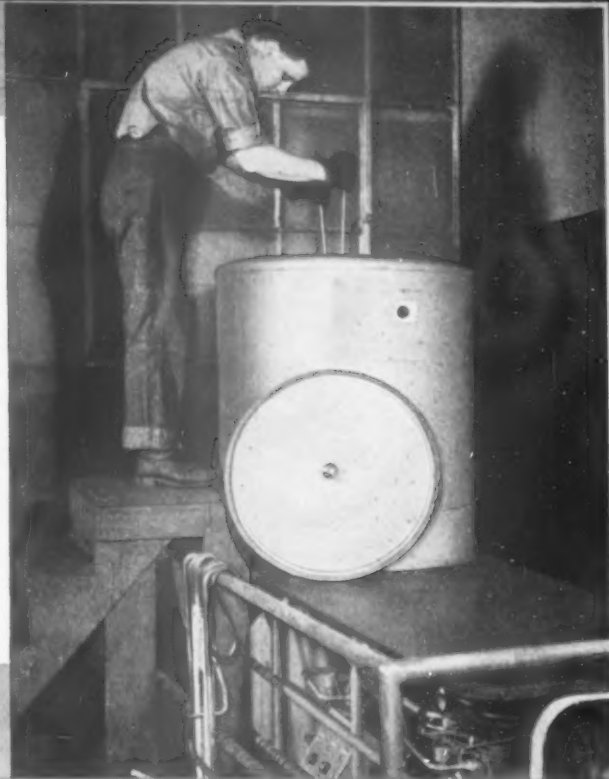


SEND TODAY FOR
CATALOG No. 43

Contains complete data on all standard fittings for tube sizes ranging from 1/8" to 2"



**COLD TREATING now
permits salvaging of
broken cutting tools!**



Chilling in Deepfreeze at -120° F., After Brazing Operation, Restores Original Hardness to H.S.S. Formed Cutter...

The 8 $\frac{3}{4}$ " x 1 $\frac{1}{4}$ " special formed milling cutter shown above was broken in two in a prominent machine tool manufacturer's plant.* Ordinarily this expensive tool would have been scrapped because welding or brazing would soften the cutting edge. However, this company had previously hardened tool steels by chilling in a Deepfreeze, and thought it possible to restore hardness to the cutting edges of the brazed tool. After a brazing operation and sharpening to its original form, the cutter was chilled at -120° F. for two hours in a Deepfreeze Cascade -120° F.

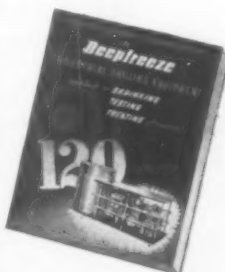
*Manufacturer's name upon request.

Industrial Chilling Machine. The result was that the original hardness of the teeth at the point of the weld was restored.

Now with this new method of treating welded and brazed cutting tools it is no longer necessary to scrap all broken tools. If it is possible to restore a broken tool to working condition by welding or brazing, cold treating will return the cutting teeth at the point of weld to their original hardness. Thus it is often possible to salvage expensive tools that otherwise would be scrapped. In addition, production delays and costly machine downtime are eliminated.

FIND OUT HOW YOU CAN USE A DEEPFREEZE IN YOUR PLANT...

For the complete and latest data on the use of Cold Treatment for metals in industry today, get the new Deepfreeze Metal Chilling Data Book. In this handy working guide on the use of industry's newest production tool you can learn how to use sub-zero temperatures for the shrinking, testing, hardening and stabilization of metals in your plant. A free copy can be obtained by writing Deepfreeze, North Chicago, Illinois. Write today for as many copies as you need.



REMOVES 1000 BTU's PER HOUR AT -120° F. WHEN WORK IS IMMERSSED IN CONVECTION LIQUID...

In addition to the application described above, Deepfreeze Industrial Chilling Machines are finding unlimited use in a wide variety of industrial fields. The Deepfreeze Cascade -120° F. Industrial Chilling Machine has a chilling capacity for high production metal chilling of many parts where large quantities of heat must be removed fast.

Let Deepfreeze engineers assist you in obtaining the advantages of cold treating. Send an outline of your problem together with parts or prints for a preliminary analysis or test. There is no obligation.

Deepfreeze

**2311 DAVIS STREET
NORTH CHICAGO, ILLINOIS**

TRADE MARK DEEPFREEZE REGISTERED UNITED STATES PATENT OFFICE
Industrial Chilling Equipment for Shrinking, Testing, Hardening and Stabilizing Metals

Division of Motor Products Corporation, Detroit, Michigan

INVITATION



to
**FASTER,
BETTER
FINISHING**

This
FREE BOOK
tells you all about

WET-ABRASIVE Belt SURFACING

the modern method that:

- ★ is 5 to 25 times faster.
- ★ works an entire area at once.
- ★ produces final finish while taking cut.
- ★ holds close limits, often .0005".
- ★ eliminates heat, dust, distortion, flow, discoloring, chipping.
- ★ enables inexperienced workers to do precision work from the start.
- ★ is reorganizing manufacturing and assembly procedures, and breaking old, familiar bottlenecks.

Porter-Cable presents all the facts in its latest booklet, "A New Precision Machining Method". It is more than a catalog—it is virtually a treatise on Wet-Belt Surfacing, one of the greatest machining aids to come out in years. Send today for your copy—fill in the coupon below.



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Please send me a copy of "A New Precision Machining Method".

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Company Title

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OR
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Call "DETROIT"



The wartime growth of our business is due not only to the general increase in metal-working activity but also to our genuine desire to serve the best interests of every customer, and help solve their production problems. We invite your inquiries regarding standard and special die sets, all steel and semi-steel, dowel pins, cap screws, die springs and other accessories.

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DIE SETS ★**



DoALL GRINDER, Model G-1—The new hydraulic surface grinder gives up to .0001" tolerance. Designed for all precision toolroom work.



DoALL MAGNETIC CHUCK—Holds all work absolutely rigid. Mount on any grinder table. Wired for both 110 and 220 volt D. C.



DoALL SELECTRON—Provides DC current to chuck. De-magnetizes chuck in 15 seconds. Varies magnetic power to grind heavy, thin or fragile work.



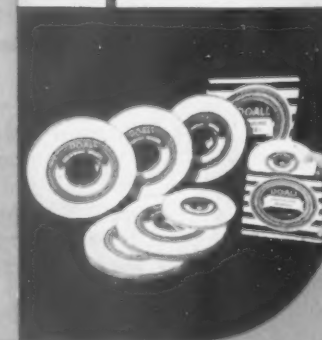
DoALL DUST COLLECTOR (corner)—A compact unit that catches even the most minute dust particles. Noiseless operation. Easy to empty.



DoALL COOLANT SYSTEM—Dissipates heat and precipitates all grindings. Pumping capacity 1 to 30 gallons per minute, ample volume for all DoALL grinding operations.



DoALL 470 SOLUBLE OIL—Finest lubricant for all high precision grinding. Colloidal graphite homogenized to reduce friction, saves time and tools.



DoALL GRINDING WHEELS—Specially balanced to eliminate vibration. Necessary to really accurate surface work. Various grains; two sizes, 7 and 10" diameter.

DoALL Presents

COMPLETE EQUIPMENT for BETTER GRINDING

Establish a reputation for the finest precision grinding with these modern grinding necessities.

DoALL Products listed on this page, used in conjunction with any good surface grinder give a grinding service second to none for regular production or for tool room operations requiring grinding to very close tolerances.

*Send for the DoALL book illustrating
all these Necessities.*



DoALL

INDUSTRY'S NEW SET OF TOOLS

Write for Literature on above Products to
CONTINENTAL MACHINES, Inc. 1304 S. Washington Ave.
Minneapolis, 4, Minn.

Sales & Service Offices: Baltimore, Boston, Chicago, Cleveland, Denver, Detroit, Erie, Houston, Indianapolis, Los Angeles, Milwaukee, Minneapolis, New Orleans, New York, Orlando, Philadelphia, Pittsburgh, Portland, Rochester, Rockford, St. Louis, Salt Lake City, San Francisco, Seattle, Spokane, Toledo, Tulsa, West Hartford.

NEW



**TAMALOY
DIAMOND HONES**

Have These Four Important Features

- ① Tools easily honed—kept highly polished—before each shift or with tool in machine—cuts down on carbide-tool grinding.
- ② Keeping tools sharp saves set-up time in changing to new tools, speeds machine output and reduces work spoilage.
- ③ Tamaloy Hones are long-lasting. Diamonds set in tungsten carbide resist wear. Carbide matrix prevents diamonds from falling out when rubbed against hard surface or edge.
- ④ Supplied in three grades — rough, medium and fine or 100, 150 and 200 grit.

**ASK FOR PRICES
AND OTHER DETAILS**

TUNGSTEN ALLOY MFG. CO.

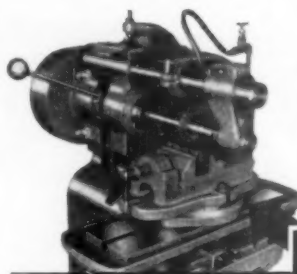
63 COLDEN STREET, NEWARK 4, N. J. formerly Circle Tip Tool Co.

Producto Machine Vises

Everything in Machine Vises—from small 3" Drill Press Vise to 9" Heavy Milling Machine Vise including hardened and ground Precision Tool Room and Jig Borer Vises, Plain, Swivel and Angle Vises in various sizes,—Quick-Acting Cam Lock Vises for production purposes.

All are of modern design and made for rugged wear and accuracy.

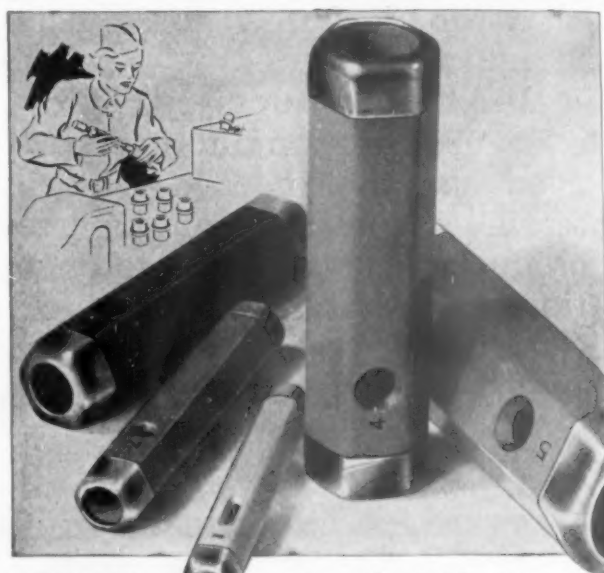
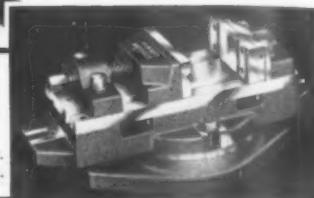
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Manufacturers of Producto Die Sets and Die Makers Accessories.

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**PRODUCTO
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3017 MEDBURY DETROIT, MICH.



FEDERAL Taperlock Plastic GAGE HANDLES

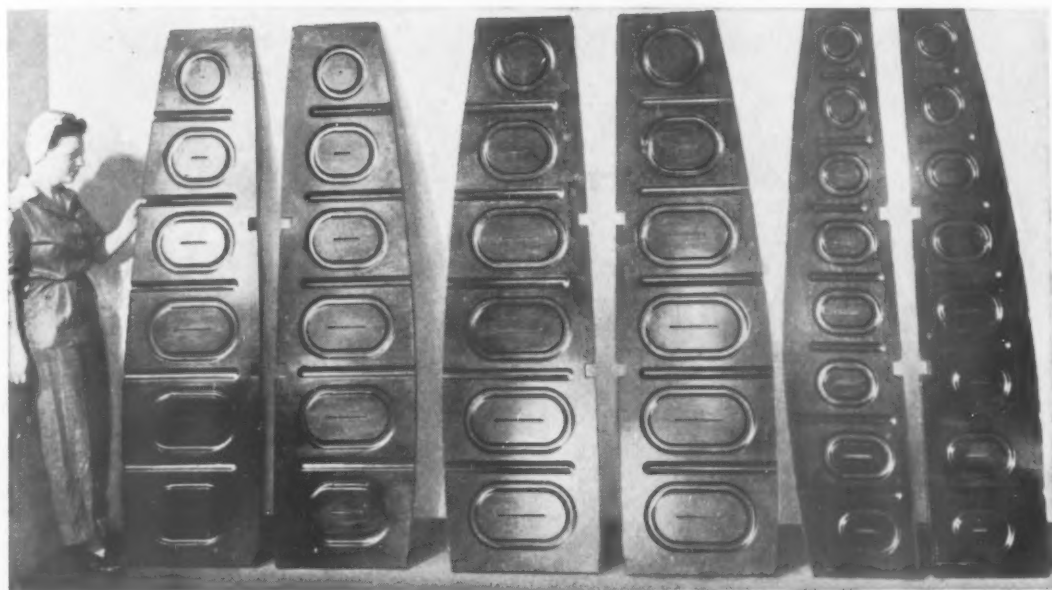
Federal Plastic Gage Handles give gages a more sensitive touch because they are lighter than any metal. They reduce fatigue and insulate from body heat, safe-guarding accuracy. ⒸMarked for identification with the same stamps used for marking metal handles. ⒸIdeal for Glass Gages which require Handles of light weight for best results, reducing danger of breakage as well as adding to sensitivity. ⒸAvailable in seven standard sizes and in colors—Red, Yellow, Green and Black for easy identification. ⒸNew low prices represent a real saving. ⒸNow available for smaller gages—size 00 in same colors.

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THE TOOL ENGINEER

Meet the Light-weight Champion MASONITE* DIE STOCK



These six-foot wing rib dies, used in a hydro press, are made of Masonite Die Stock. Photograph courtesy of Schlenzig Manufacturing Company, Camden, N. J.

ALTHOUGH it's only one-sixth the weight of steel, Masonite Die Stock is proving to many aircraft manufacturers that it can stand up to the toughest jobs.

Even in large dies, you don't have to worry about this material bowing or taking a set after routing for beading and lightening holes. Masonite Die Stock has very high compressive and flexural strength. Dies made from this dense, durable material remain flat.

This amazing semi-plastic material can be fabricated in pattern or metal shops in a fraction

of the time required for metals . . . stands up under present-day production requirements . . . saves time, money and effort.

Because of their remarkably light weight, dies made of Masonite Die Stock can be easily handled in and out of hydro press or power brakes by either men or women. Hoists and cranes are rarely required.

This modern, dependable die stock is available in thicknesses of $\frac{1}{4}$ to 2 inches . . . in sizes of 48 x 72 inches and 48 x 144 inches. For more details, mail coupon below.



*TRADE-MARK REG. U. S. PAT. OFF. "MASONITE" IDENTIFIES ALL PRODUCTS MARKETING BY MASONITE CORPORATION. COPYRIGHT 1943, MASONITE CORP.

MASONITE CORPORATION Dept. TE-2, 111 W. Washington St., Chicago 2, Ill.

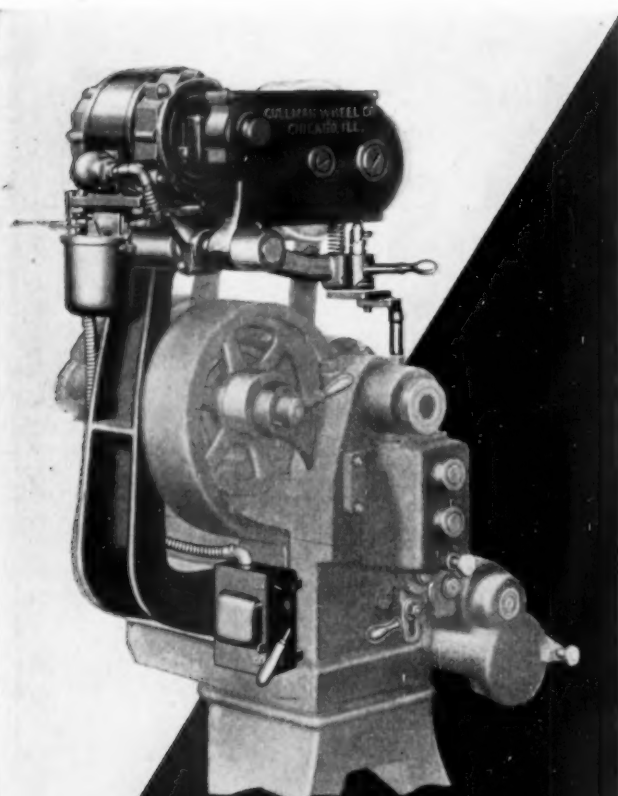
Please send me illustrative literature and complete information about Masonite Die Stock.

Name and firm _____

Address _____

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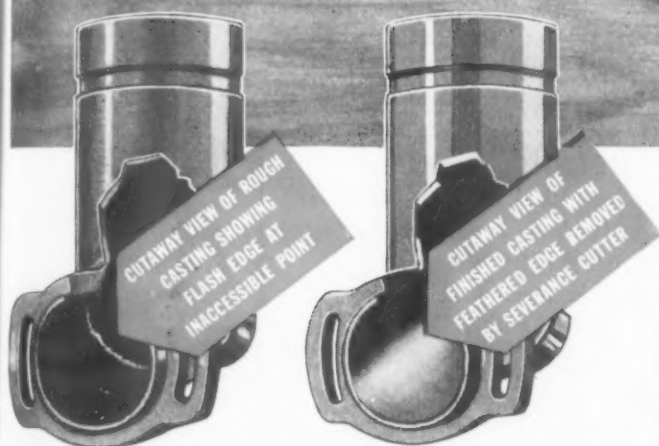
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Severance regrinding service saves you time and money. Severance complete line of "Carbide" midget milling cutters are now available.

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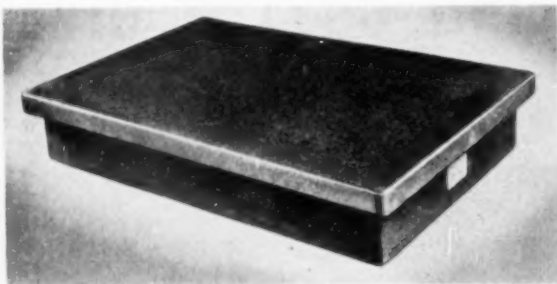
Severance Midget Milling Cutters are efficiently finishing castings, parts and patterns made of metals, alloys, plastics and wood. With portable power tool, with stationary set-up or by hand, Severance Cutters do the finishing job cleaner, faster and easier.

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DROP FORGED SETTING-UP TOOLS

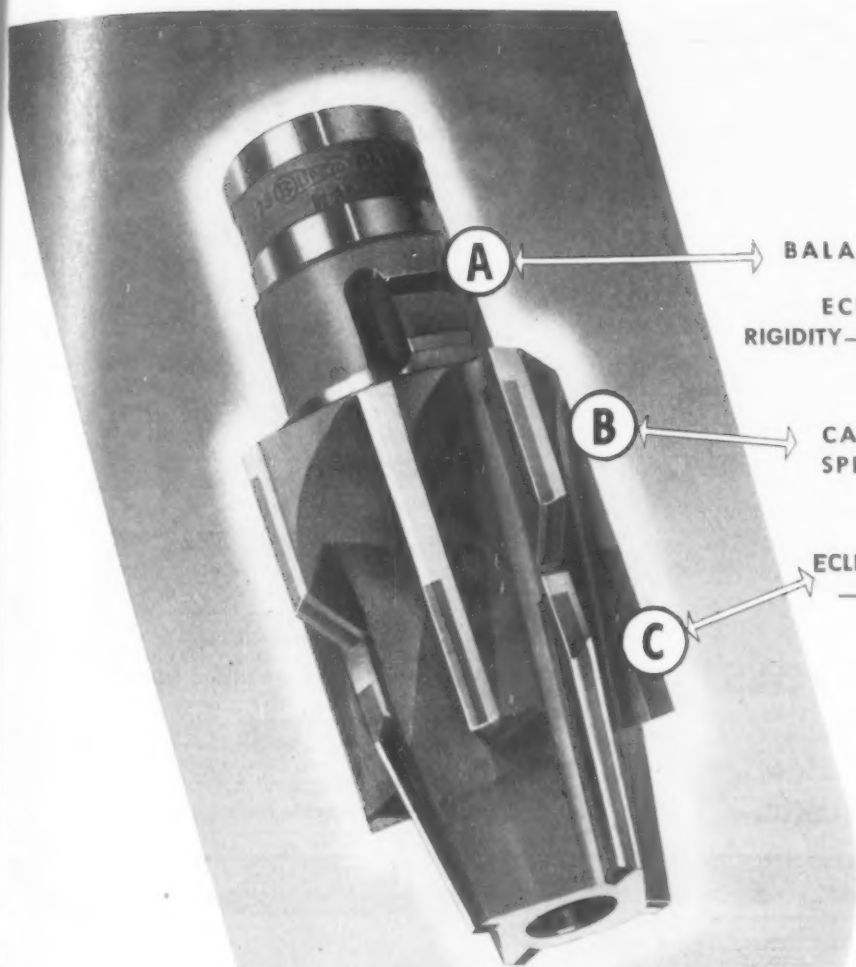
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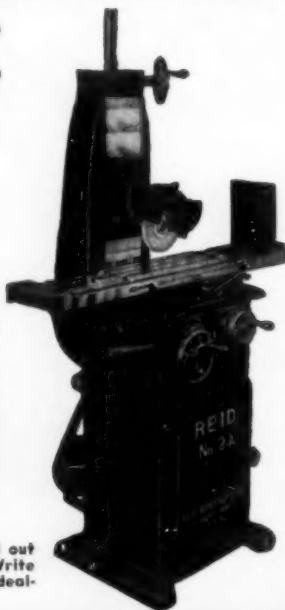
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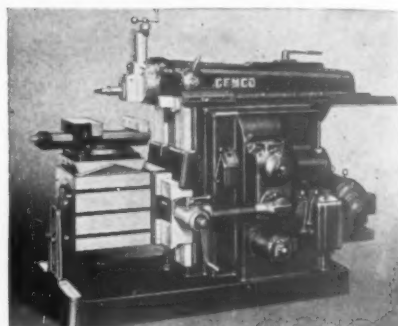
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Massively constructed with a large table to handle medium heavy work on a peak production basis with high limits of accuracy.

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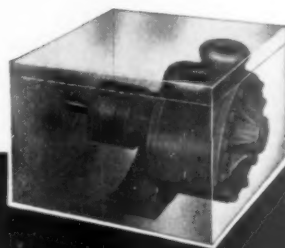
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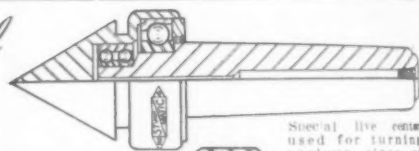
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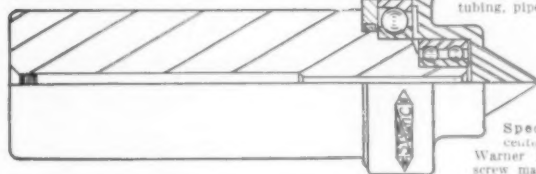
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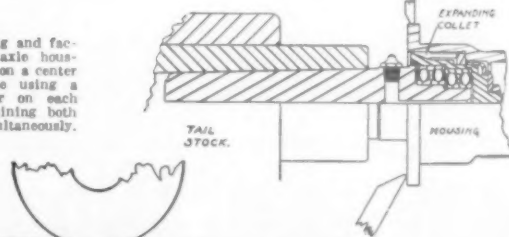


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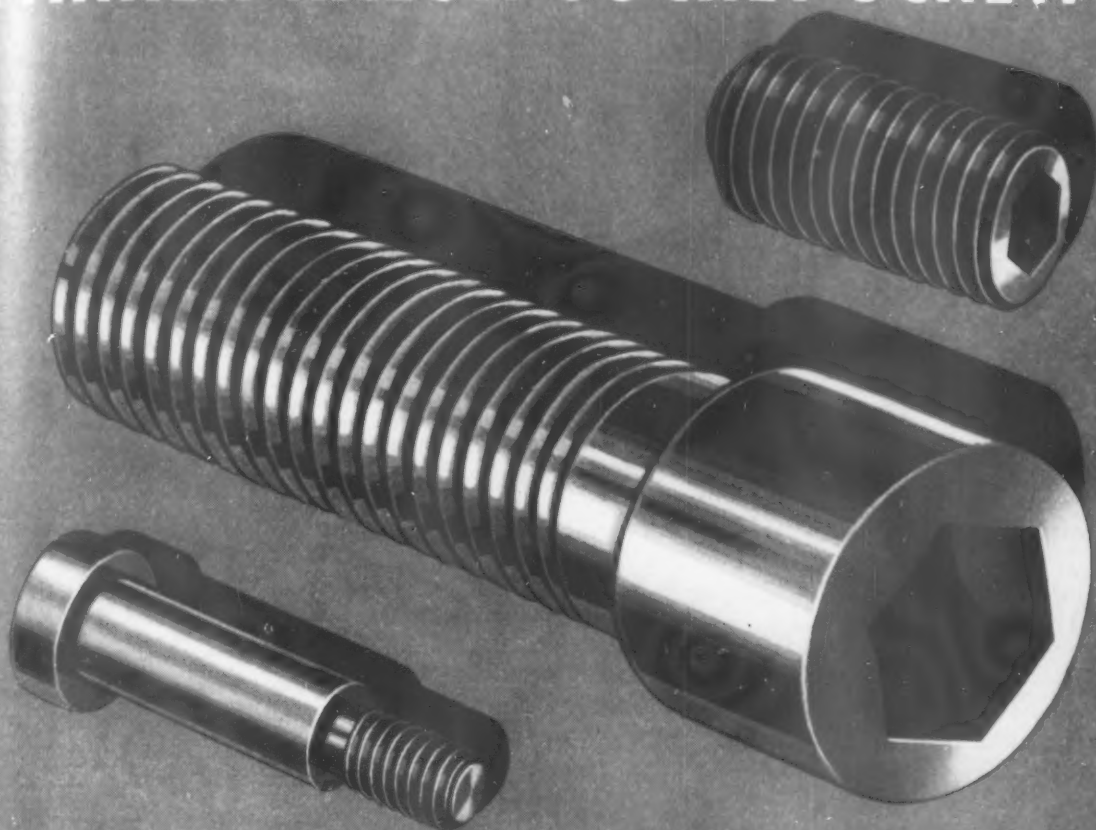
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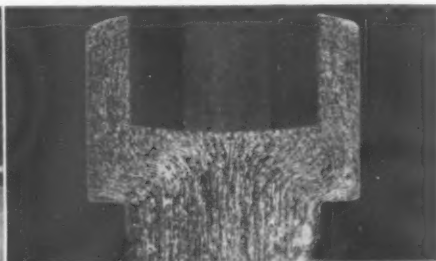
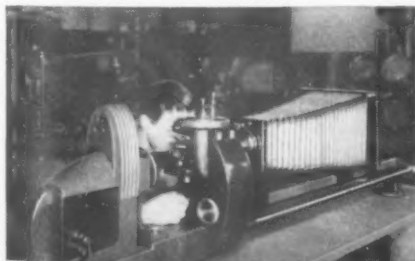
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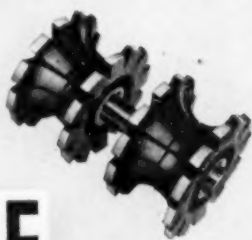
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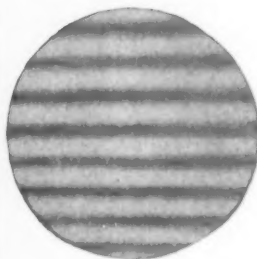
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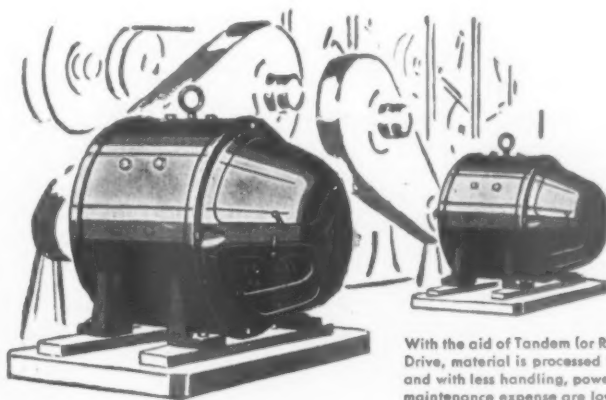


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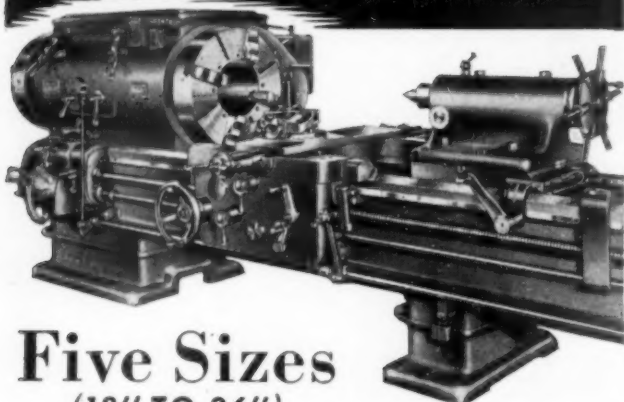
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BARTELT
PEDESTAL
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MICROMETER HEAD
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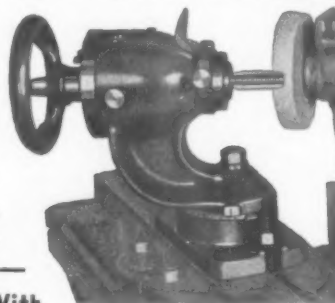
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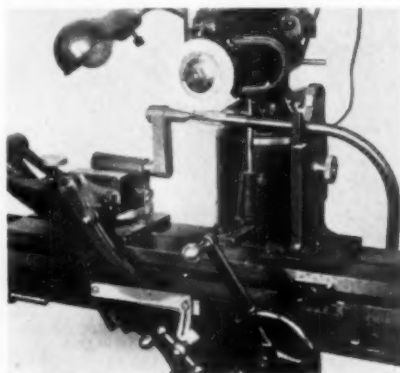
mounted upon a large circular turntable. Each of the eight spindles is an individual turning and facing machine with its own set of tool blocks. The turntable revolves slowly, bringing each of the eight spindles in turn to the loading station. A safety feature is that the spindle does not rotate and tools are retracted to permit unloading and reloading in safety.

Identical tooling can be performed simultaneously upon eight workpieces, or the machine can be arranged to perform successive operations by setting up four spindles to perform one operation and the next four spindles to perform another. Provision is made for

changing the speed with which the turntable revolves and the speed at which individual spindles run.

NEW MACHINE GRINDS (M85) BENT SHANK TAPS

As many as ten grinds, each of which has true circular relief and is equal to



Circular Relief Tap Grinder

or better than the original factory grind, are possible on long lead and bent shank taps with its circular relief grinder, according to the Cleveland Tool & Engineering Co.

Extremely simple in both principle and operation, a constant height "V" block attachment enables even inexperienced operators to center a tap of any diameter in a few seconds. Following the exact outside contour of the tap or

reamer is accomplished automatically. Equal relief is given to each cutting edge of the tool by setting the graduated adjustable cam to the correct position.

The company states that its development makes possible for the first time machine grinding of "bent shank" taps.

ALLOY COMPOUND MOUNTS (M86) DIAMONDS RIGIDLY

Known as Peralloy, a new compound of metals forming an alloy for mounting or setting diamonds in tools has been developed by E. Karsen, Inc.

Used for setting diamonds in tools used for trueing, cutting, boring, turning, broaching, thread cutting, and similar operations, the compound does not subject the diamond to excessive heat in mounting, according to the company. Other features cited by the manufacturer for the compound are that diamonds are held rigid indefinitely, irrespective of the heat when the tools are used or of the treatment to which the tool is put, and that diamonds can be reset without being ruined.

CONTINUOUS BAND (M87) FILING MACHINE

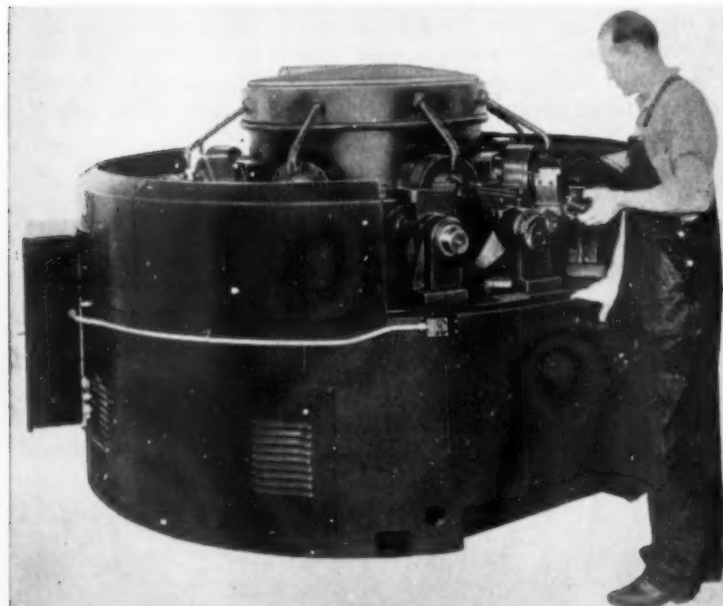
Continental Machines, Inc. announces a new low cost continuous band filing machine for file broaching operations on metals, alloys, plastics, fibres and wood.

The machine is designed especially for lower production costs in cleaning up or finishing materials previously

(Continued on page 166)

Right: This Continuous Band Filing Machine is Designed For File Broaching Operations by Unskilled Workers.

Below: Built With Eight Work Spindles Mounted on a Turn-table, This Machine Does Single or Multiple Operations.



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PERMIT No. 6691
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DETROIT, MICH.



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**NEW EQUIPMENT
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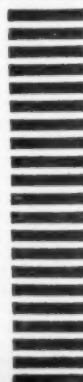
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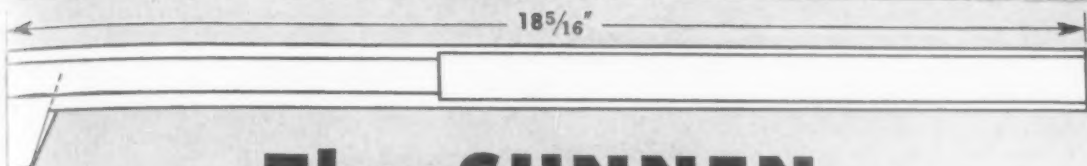


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OS



The SUNNEN PRECISION HONING MACHINE

"Did such a fine job of honing it will pay for itself many times over in the saving of scrap parts and time" . . .

Mr. A. G. Massey, Massey Machine Company



The coveted Army-Navy "E" waves over the Sunnen plant—evidence of the important part Sunnen Equipment is playing in the war effort.

The drawing shown above is of a steel part from a 20 MM aircraft gun. By former methods of honing, too many of these parts were being rejected because they were being cut oversize with no means of salvaging them.

A consultation with a Sunnen Service Engineer led to the installation of the Sunnen Precision Honing Machine to handle these finishing operations. In the manufacturer's own words—"This machine is going to pay for itself many times over in a short while in saving of scrap parts and time." In addition, he is getting a better surface finish.

Consider These Advantages

Wide range—handles internal diameters of .185" to 2.625". Accuracy within "one-tenth" guaranteed—has been held to .000025" on production jobs. Relieves big internal grinders for other jobs. Corrects errors of out-of-roundness or taper caused by previous operations. Facilitates duplication of sizes. Does not require skilled labor. Practical—inexpensive—economical to operate.

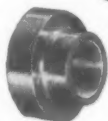
Put Sunnen Honing to work in your plant!

SUNNEN PRODUCTS CO., 7932 Manchester Ave., St. Louis, Mo.

Canadian Factory: Chatham, Ontario

Typical Jobs

SUNNEN



Aircraft Instrument Panel Control Wire Bushing. Hole .187" diameter—held to .0002" stock removal .001", sixty per hour.



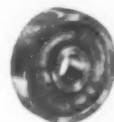
Aircraft Hydraulic Brake Cylinder. Honing 3 times faster than lapping—and gave a straighter hole.



Roller Bearing Outer Race. Finish improved from 12 micro-inches to 2 micro-inches.



Header Die. Life of header dies increased 3 to 9 times over lapping. Knock out pin breakage practically eliminated.



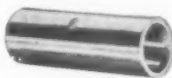
Aircraft Valve Tappet Roller. Honed after grinding to give 100% bearing surface.



Stainless Steel Load Compensator Valve Seat. Hole is honed to .0002" limit.



Aircraft Carburetor Operating Valve Sleeve. Sunnen honing eliminates distortion from assembling operation.



Aircraft Piston Pin. Sunnen honing is twice as fast and gives a cleaner, better looking pin.



Bearing. A very small part. 2 micro-inch finish necessary.



Automobile Distributor Shaft Gears. Taper removed at a rate of 80-90 per hour.

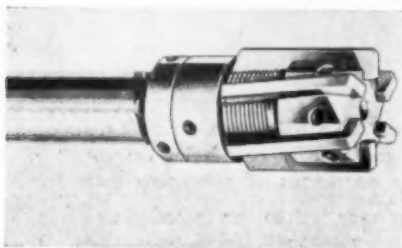
sawed, nibbled, burned, stamped or cast. According to the manufacturer, comparatively unskilled labor can produce finishes equal or superior to that of hand experts with long experience. Tolerances can be held as low as .001". Work pressure and filing speeds are under the control of the operator assuring a surface that is "machine finished".

The company states that tests on all types of materials show that filing action is nine times faster than by hand filing and four times faster than by reciprocal machine filing. File bands for use on machines are available in sizes ranging from $\frac{1}{4}$ " to $\frac{3}{8}$ " wide in ovals, half rounds, or flats.

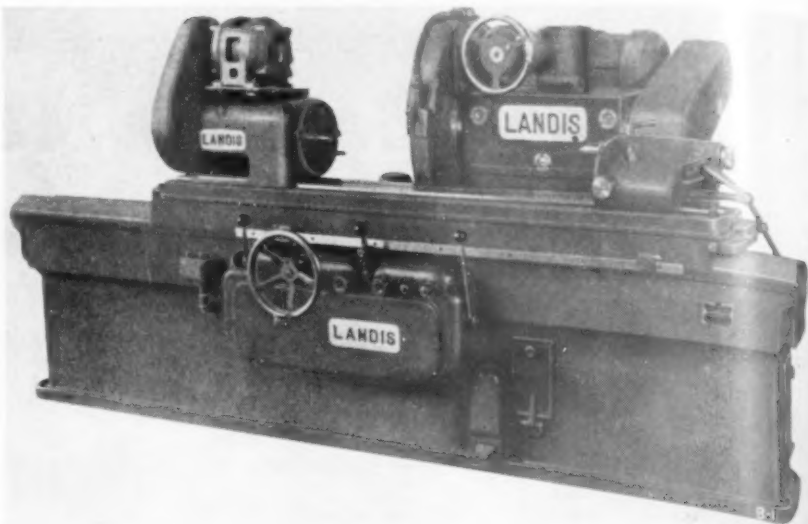
REAMER LINE FEATURES (M88) ADJUSTABLE BLADES

Wetmore Reamer Co. has announced a new line of reamers comprising left and right-hand cutting angles, with high-speed steel, cast alloy or tungsten carbide tipped inserted blades.

New tool efficiency with consequent saving in tool cost and greater accuracy



New Wetmore Reamer



Redesigned and Improved Model "CH" Landis Tool Grinder

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in production are provided by the adjustable inserted blades, according to the company. Reamers are available in sizes and styles for holes $\frac{5}{8}$ " to $3\frac{1}{32}$ " ; 1" to 3" ; and from 1- $\frac{1}{4}$ " to 6".

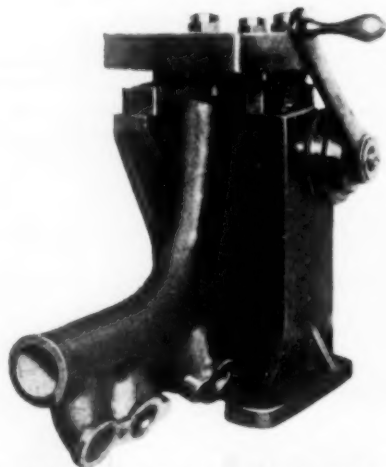
LANDIS GRINDERS REDESIGNED

(M89)

Landis Tool Co. announces that its 10" and 14" plain hydraulic grinders have been redesigned and improved and are now being offered under the designation "Type CH".

Wheel feed mechanism has been completely redesigned to permit accurate setting for the desired amount of hand feed in tenths of thousandths in terms of work diameter reduction. The au-

(Continued on page 168)



In drilling flange hole of this exhaust manifold a special base was provided on account of its height. However a Swartz L type fixture is plainly recognized.

Reduce Clamping Time of Odd Shape Parts

Rapid Clamping Can Be Applied to Any Part

One Wrench Often Replaces Four Slow Operating Clamps

Ask for Catalog 941

SWARTZ TOOL PRODUCTS CO., INC.

13330 Foley

Detroit, Michigan

Represented by

Cleveland—J. W. Mull, Jr.
Indianapolis—J. W. Mull, Jr.
Milwaukee—Geo. M. Wolff, Inc.
Chicago—Ernie Johnson

Canada—Hi-Speed Tools, Ltd., Galt, Ont.
St. Louis—Mill Supply & Mach. Co.
Beverly Hills, Cal.—Production Tool Engineering
Houston—Engineering Sales Co.

Oneida, N. Y.—W. F. Himmelsbach
Pittsburgh—J. W. Mull, Jr.
Toledo—J. W. Mull, Jr.
Philadelphia, Pa.—Morgan Tool & Equipment Co.

★ ★ ★
 TO DO A BETTER JOB WITH NATIONAL EMERGENCY STEELS, USE



SAFETY'S NEW NO. 277 GRINDING WHEEL

If you work with National Emergency Steels — if production and efficiency and economy are vital factors in your plant—then by all means investigate the new No. 277 Safety Grinding Wheel. Here is a wheel with a sensationally NEW BOND—a bond developed especially for centerless and cylindrical precision grinding of National Emergency Steels.

Greater latitude of operations is provided . . . assuring faster grinding — improved cutting action — better finish. There is a specific No. 277 Safety Wheel for every National Emergency Steel grinding job. Write us today for illustrated folder and full details on how the No. 277 Wheel is helping to break production records in scores of war plants.

THE SAFETY GRINDING WHEEL AND MACHINE COMPANY

Main Office and Factory SPRINGFIELD, OHIO, Phone 4651

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● Birmingham—3-3323 ★ Chicago—BRUnswick 2000 ★ Cleveland—CEdar 9292 ★ Detroit—TOwnsend 8-4740
 ★ Pittsburgh—COurt 2822 ★ Erie—25-687 ★ Philadelphia—WAlnut 3132 ★ St. Louis—CEntral 3787
 ★ Syracuse—2-2191 ● Milwaukee—BLuemound 0742

tomatic wheel feed, built into the wheel base, is automatically reset at the end of each grinding cycle.

The grinding wheel guard is mounted stationary on the wheel base with a hinged side to facilitate changing of wheels. A hinged hood at the front of the guard is adjusted inward as the wheel wears down. The headstock is much lower than on former models and is compact in design.

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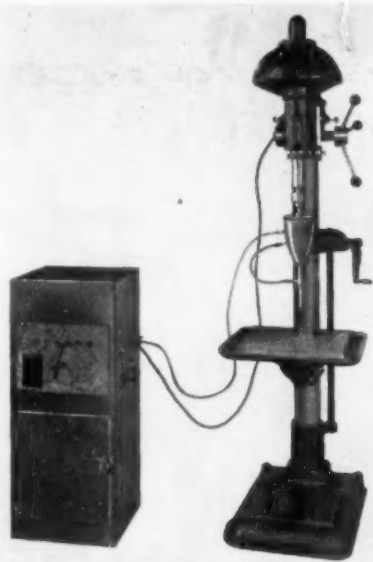
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METAL DISINTEGRATOR (M90)

A relatively low cost method of disintegrating metal to remove broken studs, taps, drills, and similar tools from holes in machine parts has been developed by Bertrand's Machine Co.

The disintegrating equipment, which consists of a transformer and compact cooling system, makes use of a non-ferrous electrode or tip with a hollow center through which the coolant flows. The unit is mounted on a drill press or similar type machine.

Operation is automatic or semi-automatic. The work is clamped on the table of the machine and the suspended electrode or tip is centered on the broken tool which is to be removed. Electricity and coolant are turned on and the tip is lowered sufficiently to



Broken-Tool Remover

make electrical contact with the work.

The disintegration proceeds at an average rate of 1/32" per minute depth, with the rate dependent in part on size of the tool to be removed. When the center or core of the tool has been completely removed or disintegrated, the remaining ring or strips of metal are picked away from the wall. Although most efficient on very hard steel, the

method will disintegrate other alloys, particularly those containing iron.

Working temperature is 130° F. at which level there is no danger of distortion. There is no hammer blow to damage parts, no electrolysis or similar effects on the part, no dangerous fumes, and a voltage range of 2 to 12 volts.

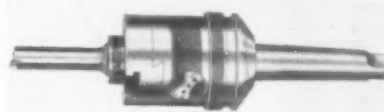
TOOL HEAD FOR BORING AND FACING (M91)

Chandler Tool Co. announces a boring and facing tool head with which all operations such as turning, boring, facing, undercutting, recessing and similar jobs can be accomplished at one setting.

Another feature of the tool is a power uniform speed obtained through a ring gear on the top of the head which drives a pinion shaft upon which a worm is mounted.

Capacity of the tool head is from the smallest holes to those up to 8" in diameter. The standard tool is 3" diameter by 3 7/8" long. Maximum slide travel is 1 1/4". Standard equipment includes tool head with shank, threaded bar holder with ring lock nut, straight boring bar with quarter inch square slot in each end, and extension bar holder.

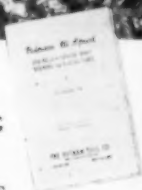
(Continued on page 170)



Chandler Tool Head



OUR CATALOG
IS OUR
STOCK LIST



ON
THE
JOB.

within
48 HOURS
After Your Cutting
Tool Order Reaches
the Putnam Factory

If you have a job for which you have immediate need of any one of hundreds of different end mills, Putnam can get the tool of the right type and size to you within 48 hours. In many cases, tools which you would ordinarily consider as "special" cutters are manufactured as standard and carried in stock.

Also immediately available from stock are complete lines of continuous pilot counterbores, spiral fluted chucking reamers and end mill holders.



PUTNAM TOOL COMPANY
2987 Charlevoix Avenue • Detroit 7, Michigan

ACCURATE AT ANY ANGLE!



◀ OBLIQUE

Grinding grooves in rolls for tube forming machine, with Dumore mounted on compound of engine lathe, using special bracket of simple design.

VERTICAL ▶

Dumore No. 5 mounted vertically in a Bridgeport Universal Miller, grinding the contours of a motor lamination die. For vertical mounting, the quill is provided with a special oiling system to assure adequate lubrication of the top bearing.



◀ OVERHEAD

Ingenuous mounting of Dumore on double overarm of Milwaukee Miller, permits free use of table for attaching indexing fixture in grinding teeth of gear hob.



Amazing versatility of the Dumore together with its high precision convert any available machine tool into a special purpose precision grinder for a wide variety of operations. Catalog 42 is full of helpful suggestions and application data. Get a copy; write today!

The Dumore Company, Grinder Division, Racine, Wisconsin.

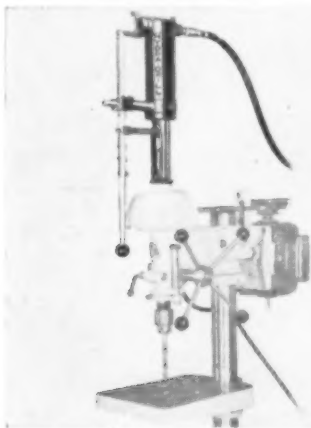
Dumore
PRECISION and
Off-Hand GRINDERS

★ DUMORE GRINDERS ARE SOLD BY AUTHORIZED DISTRIBUTORS IN ALL PRINCIPAL CITIES ★

AUTOMATIC PRESS FEED SPEEDS PRODUCTION

(M92)

Designed to operate a drill press automatically so that hand feeding is unnecessary for fast production work, an

**Air-Powered Drill Feed**

air-powered feed for nearly all drill presses has been placed on the market by The General Pacific Corp.

This controlled, automatic, fully-adjustable power feed permits the operator to devote full time and attention to feeding work to the drill press. Adjustable stops permit accurate adjustment of all drill press operations, such as drilling, counter-boring, spot facing, blind drilling, reaming, and other operations on any type of material or

parts. The range of feed can be regulated instantly for fast drilling of soft materials or slow drilling of hard pieces. A finger-tip control safety feature permits immediate release of the automatic feed.

Another feature cited by the manufacturer as being particularly valuable is that the rate of speed of the drill press spindle can be adjusted so that pressure of the drill on the work can be exactly right for any particular operation, regardless of size of drill or rate of feed.

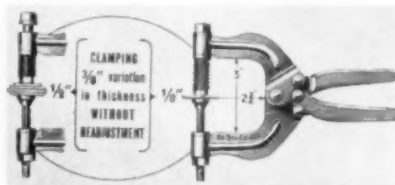
PORTABLE TOGGLE CLAMP HOLDS ODD SHAPES FIRMLY

(M93)

Recommended especially for use on sheet metal and other work where individual parts to be clamped vary in thickness up to as much as $\frac{3}{8}$ " on various locations of the same fixture group, a new portable toggle clamp has been introduced by Detroit Stamping Co.

A spring fitted into one of the adjustment spindles provides for this $\frac{3}{8}$ " variation in clamping thicknesses without need for readjustment of the spindle.

The 3" wide throat of this new clamp provides capacity to handle a greater

**Adjustable Toggle Clamp**

than average range of work, and the improved swivel foot permits clamping angles and other odd shapes securely. The clamp may be used for holding metal, wood, or plastic parts, for riveting, welding, gluing, and many other production operations. It automatically locks into position when closed and can be released instantly.

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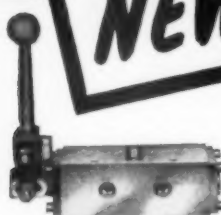
GRINDING FIXTURE FORMS CUTTER TEETH

(M94)

Hill-Bartelt Machine Co. has developed a new radius grinding fixture for use on standard tool grinding machines for profile grinding 180° radius or any lesser arc form on the teeth of milling cutters from 3" to 6" diameter and up to 1" thick.

The cutter is clamped on a plate extending from a head which has two micrometer-adjustable cross slides operating at right angles to each other. The cutter can be accurately positioned so that the center of the arc to be ground will fall exactly along the axis of the shaft on which the head is rotated. A scale provides accurate adjustment of the angle at which the tooth is presented to the grinding wheel, thus determining the backoff angle.

Other operations can be performed (Continued on page 172)

NEW!**Quick-As-Wink...****Single-Plunger Control Valves****ONLY ONE MOVING PART****Hand-lever operated****Mechanically operated****Pilot-operated spring return****Double pilot-operated****SIMPLE**

One stainless steel plunger with short travel quickly and completely accomplishes valve action.

EFFECTIVE

The higher the pressure the tighter the seal, an exclusive Q. A. W. feature.

DURABLE

Because sealing of pressure is not dependent on metal-to-metal contact between operating plunger and valve housing.

Made in more than 50 styles

SEND FOR CATALOG No. 6

C. B. HUNT & SON

1868 EAST PERSHING STREET . . . SALEM, OHIO





We would really like to know the answer ourselves. The facts in the case are that Genesee today is one of the Nation's major producers of Dovetail tools just as it is among the leaders in the production of many other types of special tools.

It may have something to do with jealous maintenance of quality—though we know other

companies make good tools too. It may have something to do with deliveries—though we haven't been too happy at times in the past when we looked at our banks of unfilled orders. Somehow "price" can't be the answer, for we have never sacrificed quality for the sake of price.

Perhaps it's just a combination of all of them. If you know, won't you tell us?

We welcome your comments and inquiries.



FOR VICTORY
BUY
UNITED
STATES
WAR
BONDS
AND
STAMPS

FEBRUARY, 1944

GENESEE TOOL COMPANY
F E N T O N , M I C H I G A N



★ Registered
Trade Mark



Radius Grinding Fixture

in addition to radius grinding. Side-cutting teeth may be ground, and tooth faces may be ground radially or with any desired hook or rake. Also a 90° round corner of any radius up to 1/2" may be ground on cutter teeth.

**PANTOGRAPHIC ENGRAVER (M95)
BUILT FOR HEAVY DUTY**

A new pantographic engraver for heavier and more varied engraving work has been announced by H. P. Preis Engraving Machine Co.

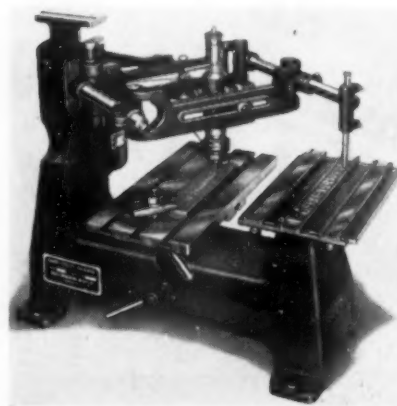
The unit is suitable for engraving on all metals and plastics, for electrical marking on steel and other ferrous metals, and for acid etching on metals or glass. It can be equipped with forming guide attachment to engrave on concave, convex, spherical, and beveled sur-

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

faces. For engraving on uneven or curved surfaces, a depth-of-cut regulator is available.

The cutter spindle, of a collet-clamping design, has adjustable ball bearings and is held in the spindle bracket with a bayonet-type lock which permits it to be inserted or removed in a few seconds. The machine is easily converted for electrical marking or acid etching by



Heavy-Duty Preis Engraver

replacing the spindle bracket with standard marking or etching units.

**BOOTH COATING
EASILY REMOVED**

(M96)

Many time saving applications are claimed by Harris Soap Co. for its prod-



Removable Booth Coating

uct, Boothcote, a spray booth coating widely used in war plants.

Applied to spray booths, conveyors and other equipment exposed to spray-painting operations, the material is easily removed by pulling it off in sheets.

(Continued on page 174)

LIBERTY Proves ONE Equals TWO

When You Use Liberty High Speed Grinding Attachments

Here is a machine tool which will DOUBLE the potential capacity of your surface grinders.

Model No. 90-31

Set at 90°, grinding a gage seat in a hard-to-get-at place. Can be set to any angle within 100°.

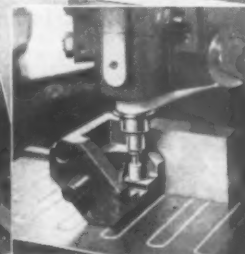
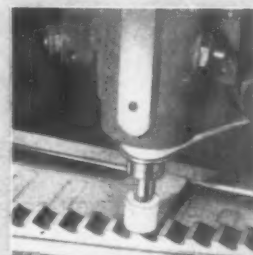
LIBERTY HIGH SPEED GRINDING ATTACHMENTS are precision built for intricate and hard-to-get-at precision grinding jobs.

Model No. 90-31

Sharpening broach with 5° clearance.

Model No. 90-31

Grinding hardened flats and blind slots in restricted working space.



Model No. 90-31

Grinding hardened work seat ordinarily hard to get at.

WRITE FOR FURTHER INFORMATION

LIBERTY TOOL & GAGE WORKS, INC.
233 GEORGIA AVE. PROVIDENCE 5, R. I.

*She can fill his shoes
better on milling jobs...
with **KENT-OWENS
MACHINES!***



NEW

Kent-Owens No. 2-20V
Vertical Milling Machine
Table, 42" by 12",
Table travel, 20"

★ For a better use of manpower and WOMAN-power...you can't beat KENT-OWENS Milling Machines! They're the *right* answer for simple, efficient, practical operation that's easy for green help to master. Ruggedly built...designed to help you meet RUSH war schedules with greater *speed* and *accuracy* in your production. Send for latest bulletins.

Kent-Owens Machine Company, Toledo, Ohio.

THERE'S A KENT-OWENS REPRESENTATIVE NEAR YOU

BOSTON General Machinery Corp.	INDIANAPOLIS Oatis-Booth Machinery Co.	PHILADELPHIA Calco Machinery Company
BUFFALO Don W. Patterson	KANSAS CITY Eichman Machinery Co.	PITTSBURGH Barney Machinery Co.
CHICAGO Neff, Kohlbusch & Bissell	LOS ANGELES Eccles & Davies Machinery Company	ROCHESTER F. W. Schiefer Machinery Company
DALLAS Hamilton-Huster Machinery Co.	HARRISBURG Harron, Rickard & McCone	SAN FRANCISCO C. F. Bulotti Machinery Co.
DAYTON Gosiger Machinery Co.	MILWAUKEE Neff, Kohlbusch & Bissell	SEATTLE Star Machinery Company
DETROIT A. C. Haberkorn Machinery Co.	MOLINE John J. Normoyle Co.	ST. LOUIS Blackman & Nuettel Machinery Company
GRAND RAPIDS Joseph Monahan	MONTREAL F. F. Barber Machinery Co.	CLARKE EQUIPMENT CO.
HOUSTON Oliver H. Van Horn Co., Inc.	NEW ORLEANS Oliver H. Van Horn Co., Inc.	SYRACUSE J. F. Owens Machinery Co.
	NEW YORK Wilson Brown Company	TORONTO F. F. Barber Machinery Co.
		WALKERVILLE F. F. Barber Machinery Co.

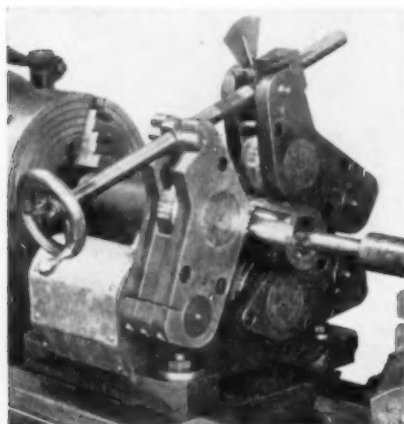
*Call on **KENT-OWENS**
for Milling Machines*

rather than by laborious scraping. The Boothcote is sprayed or brushed on booth walls, conveyor parts or similar equipment before painting begins.

STEADY-REST AIDS SECOND OPERATIONS (M97)

A heavy-duty, self-centering steady rest, especially developed for second operation work on parts requiring machining operations by either engine or turret lathes has been developed by the Charles Stecher Co.

Hardened steel rollers with heavy-duty bearings are carried in three interlocking arms, and will provide rigid and accurate support for cylindrical parts within the range of adjustment. The



Self-centering Steady Rest

clamping screw is provided with spring tension and dial indicator, to insure uniform pressure on pieces which may vary slightly in diameter.

The hand operated model shown in the illustration is intended for mounting directly on the ways of a 22-inch lathe, and has capacity of from 1½" to 9". An air-operated model designed with bracket for mounting on the back of a heavy duty turret lathe to allow clearance in front for the side turret, also is available.

INFORMATION FREE

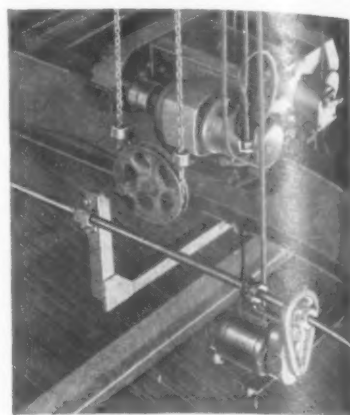
For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

CRANE POWER UNIT EASILY INSTALLED (M98)

No structural changes are required to convert a hand-traveled crane to a motor-controlled unit by use of the "Travelator", developed by Northern Engineering Works.

The only part of the crane removed is the hand pull chain. The Travelator is mounted on a channel iron in such a way that it drives the squaring shaft through a split sprocket, mounted on a split clamp. The assembly is installed without removing the squaring shaft.

Control is through the pendant cord push button which may be arranged to follow the trolley so it always is near



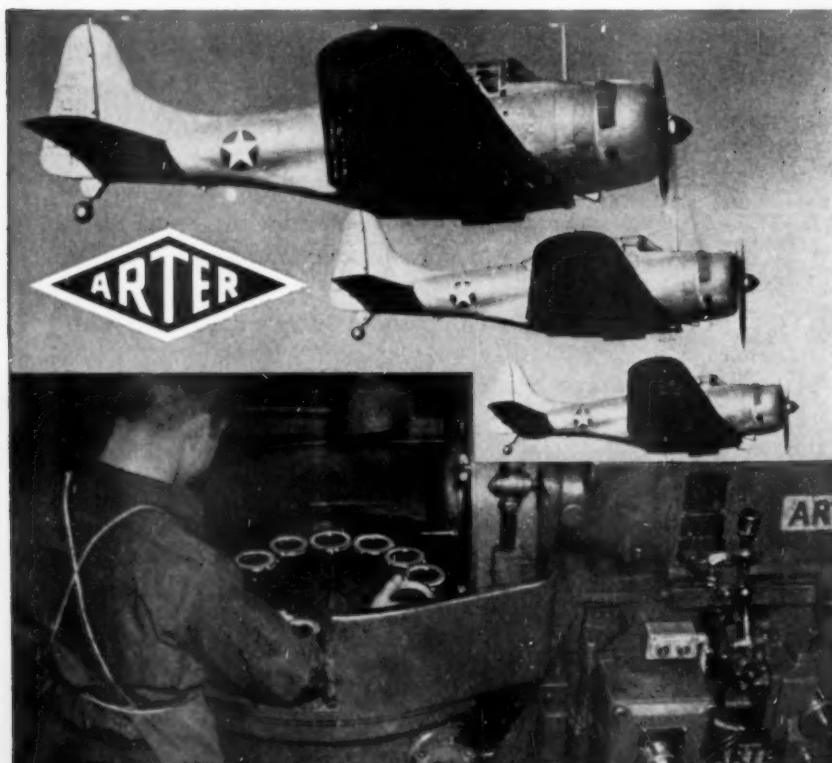
"Travelator" Power Unit

the load and the operator. The motor may be placed at any angle, since it is mounted in a steel band and may be adjusted to any position.

ANGLE GAGE BLOCKS SIMPLIFY MEASUREMENT (M99)

Precision angle measurement is reduced to an extremely simple, fast, sure operation through the use of new angle gage blocks, according to the manufacturer, Webber Gage Co.

To obtain any desired angle from 0° to 103°, blocks are selected from the set which, when added—or subtracted—will give the desired angle. The blocks are wrung together and will adhere (Continued on page 176)



Several hundred ARTER ROTARY GRINDING MACHINES are employed by Wright Aeronautical Corporation in the tremendous production of aircraft for war and victory. To build the necessary horsepower into an aircraft engine requires machinery that produces the highest degree of perfection.

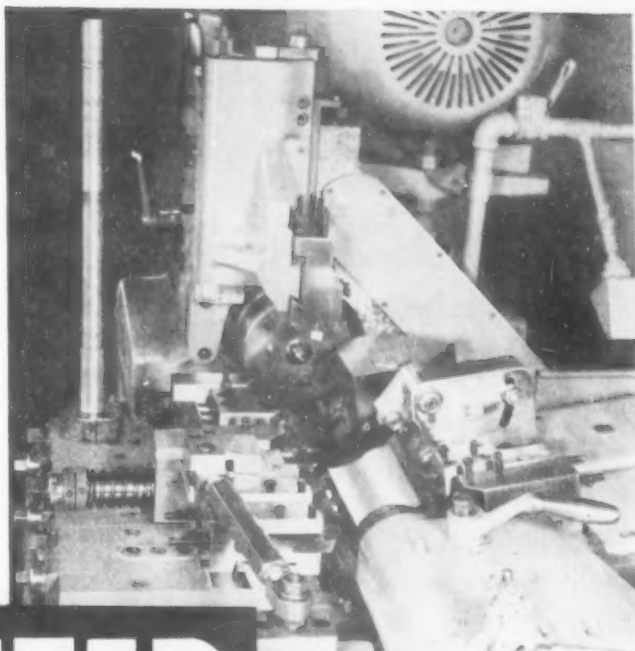
Photo—Douglas SBD "Dauntless" U.S. Navy bomber—powered by a Cyclone 9 of 1000 horsepower, manufactured by the Wright Aeronautical Corporation, Paterson, N. J.

ARTER GRINDING MACHINE COMPANY
WORCESTER, MASSACHUSETTS • U. S. A.

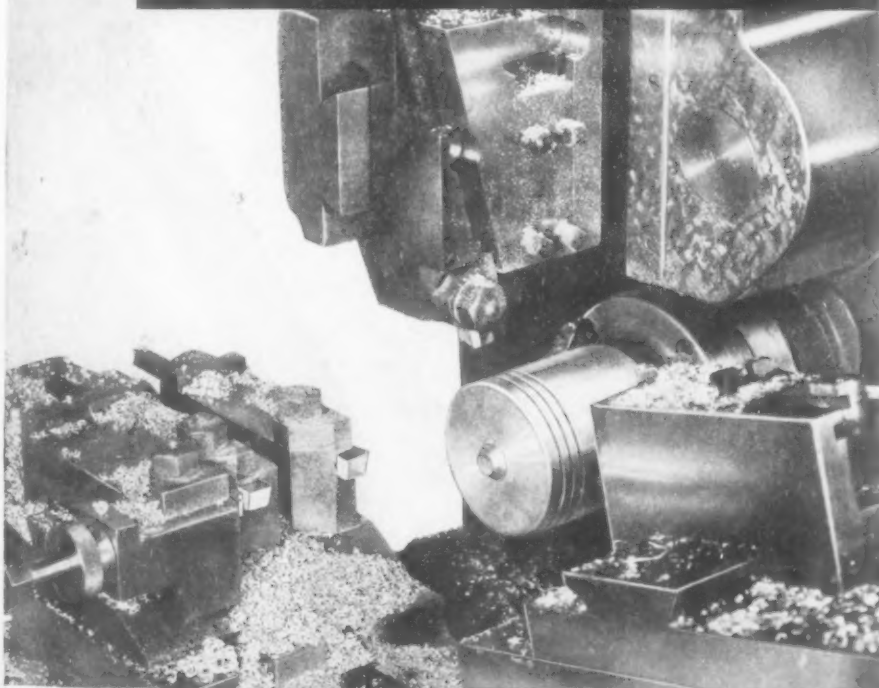
MODEL "LR" *Lo-swing*

Illustration at right shows tooling of a Model "LR" equipped for turning an Automobile Transmission Shaft. Equipment furnished consists of one three-slide Front Carriage; two Back Attachments, one carrying tools, the other a two-roll steady rest; one Top Slide; one 45° Undercutting Attachment.

The automatic cycle is as follows: First, the tools on the center slide of the Front Carriage spot the shaft for a Steady Rest bearing; Second, Steady Rest on Back Attachment moves in automatically to support work; Third, all tools start cutting simultaneously, those on Front Carriage turning all diameters, tools on Top Slide face and groove, tools on Back Attachment chamfer and groove while the Undercutting Attachment tool undercuts the head end at a 45° angle. The operation is entirely automatic. Operator merely loads and unloads and pushes starting lever.



UNLIMITED TOOLING POSSIBILITIES ARE AVAILABLE WITH THE LATEST TYPES OF AUTOMATIC *Lo-swing* LATHES



Lo-swing IMP

At left is a close-up illustration of an Imp Lathe equipped for turning, facing and rough and finish grooving aluminum pistons on a production basis.

The work is held and driven by an air-operated Wrist Pin Type Driver. The three tools mounted on the front carriage turn the skirt, ring groove lands, and round the end of the piston, while simultaneously the tools on the top slide face the end and rough turn the grooves. Immediately these tools have ceased cutting, the finish grooving tools on the rear slide finish the grooves to close tolerances.

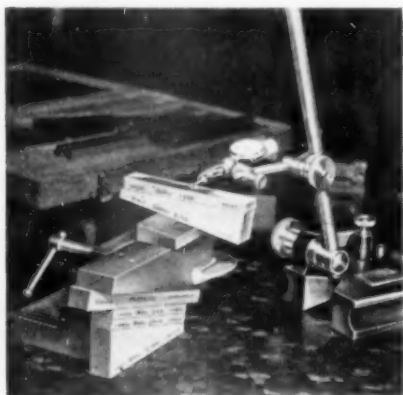
The cycle is automatic . . . the operator simply loads and unloads the pistons and pushes the starting lever.

SENECA FALLS MACHINE CO.
SENECA FALLS, NEW YORK

LATHE NEWS *from* SENECA FALLS

just as regular gage blocks. A total of 370,800 angles in steps of 1 second of an arc is provided by the set, according to the manufacturer.

Very little study is required to obtain



Webber Gage Blocks

any desired angle, the company states. No mathematical computation is involved, since each set is complete with a table showing which blocks to use and how to combine them to get any angle required. Working surfaces are optically flat and each set includes a parallel and knife edge.

**UNIVERSAL VISE AIDS
MACHINING OF ANGLES**

(N1)

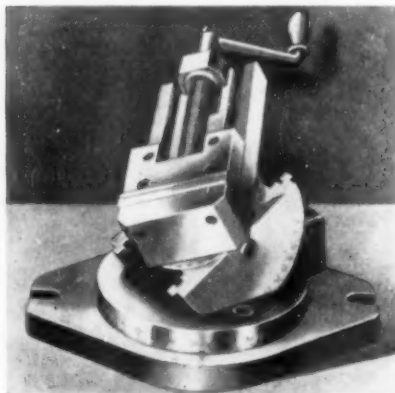
Use of the Wesson Universal Vise makes production of even the most complicated compound angles as quick and

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

easy as the machining of the most simple angle, according to the manufacturer, The Wesson Products Co.

"Cradle" design is an important factor in the accuracy provided by the vise and in its ability to handle heavy cuts, according to the maker. It is adaptable to milling, grinding, drilling, checking angles produced, and many other machine tool operations involving any type of angle. The vise swings through



Universal Angle Vise

180° in the top plane, 90° in the vertical plane and 360° in the bottom plane. For extreme precision, all models are available with vernier graduations.

**WELDING POSITIONER
EASY TO OPERATE**

(N2)

Featuring flexibility of use, simplicity, and easy operation, a new 2500 pound

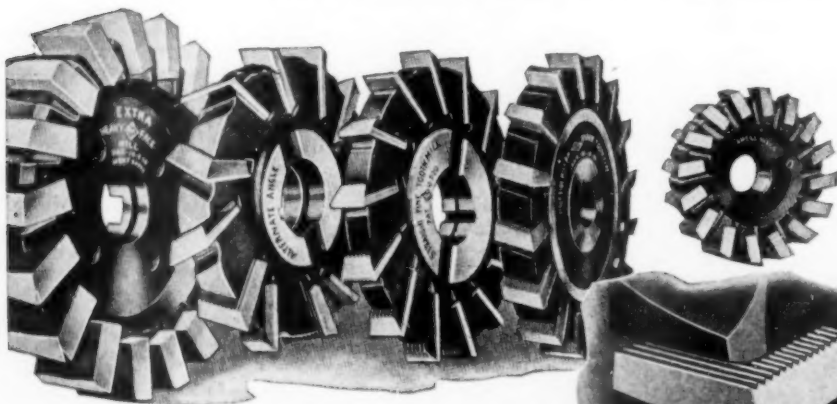


Flexible Welding Positioner

capacity welding positioner designed for production line welding as well as for job work and maintenance has been introduced by Harnischfeger Corp.

Of all-welded rolled steel construction. (Continued on page 178)

Tools That Offer No "Conversion" Problem



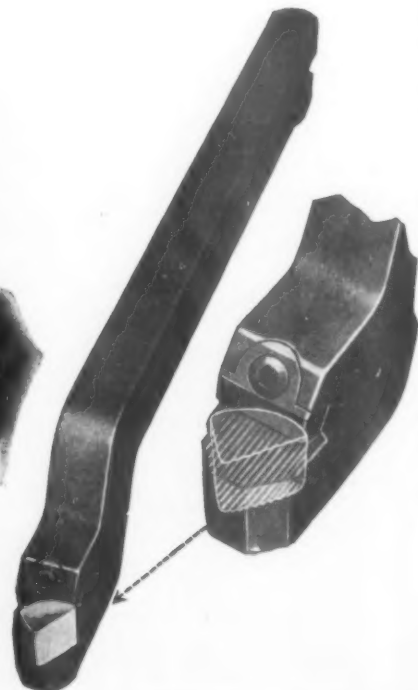
The same O K SYSTEM of Metal Cutting Tools you now find such an efficient help in meeting war production schedules will fit into your post-war set-up like a hand in a glove!

Their correct design and perfect flexibility will put them to work in any metal cutting job in your peace time program. Money put into such equipment is a **long range investment!**

THE O K TOOL CO., SHELTON, CONN.



SYSTEM
OF INSERTED-BLADE METAL CUTTING TOOLS



**O K Tools Are Available
for Every Metal Cutting Need**



Spirapoint finishes recess and produces radius*



Spiraband rapidly removes burrs and rough edges*

There's Still Time To Benefit

METALITE CLOTH GADGETS (abrasive) have made almost unbelievable records in speeding up and improving the finish of countless metal parts vital to war production.

Yet one division of a large producer may not be aware that another department has doubled or trebled output simply by adopting these skillfully designed, ready-to-use, abrasive cloth "gadgets" of the exact shapes, the very grits and just the right cushion to snug into any odd shaped part.

So even now, after two years of war, we urge you to send for our booklet, "Blue Print for Faster, Better Production". It is full of illustrations of these new coated abrasives actually at work in large war plants and shows their host of shapes, sizes and grits ready for instant application on many time-wasting operations in your own plant.

Then, to complete the service, if you just give the word, we'll have an experienced field engineer not only show them to you but *demonstrate them on your own jobs.*

Boston, Buffalo, Chicago, Cincinnati, Cleveland, Detroit, Grand Rapids, High Point, Indianapolis, Los Angeles, New York, Philadelphia, St. Louis, San Francisco, Tacoma

*TRADE MARK



BEHR-MANNING • TROY, N. Y.

(DIVISION OF NORTON COMPANY)

Reliable Coated Abrasives Since 1872

tion, the positioner features 42" diameter table, equipped with 18 radial slots for mounting fixtures and turned manually to suit welding speed. Other features cited by the manufacturer are hydraulic tilting control to as much as 135° beyond horizontal position, positive locking devices on the table, table elevation from 28" minimum to 60" maximum, and entirely enclosed gearing.

**OVERSIZE RIVET SET (N3)
REDUCES DING DAMAGE**

Elimination of the danger of dinging thin skins is the principal feature of an



Aero Rivet Set

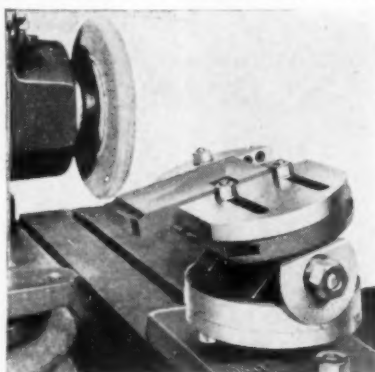
over-size rivet set of 2½" diameter, according to the manufacturer, The Aero Tool Co.

Even in the hands of unskilled labor, the extra large face and light weight of this set reduce rejects and speed flush riveting operations, the company states. Thin skins are protected from dents and abrasions while being riveted by a

very smooth finish on the crown surface.

**CHASER GRINDER FIXTURE (N4)
LOWERS REPLACEMENT COSTS**

Chief advantage of a new chaser grinding fixture developed by Oster



Oster Chaser Grinding Fixture

Mfg. Co. is that it saves cost of replacing dies and chasers which are often ruined from either lack of proper grinding or from too long use between grinds, according to the manufacturer.

Other features advanced for the fixture are that it eliminates the need for purchasing duplicate sets of chasers for use while worn chasers are returned to the factory for regrinding, avoidance of wear and tear on threading machines caused by heavy strain imposed by dull or broken chasers, and reduction of un-

necessary costs of re-threading pipe or bolts cut by dull chasers.

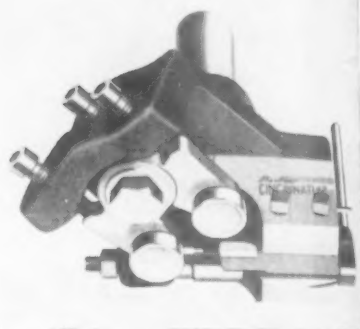
Designed for easy mounting on the table of any conventional tool and cutter grinding machine, the fixture is adjustable for any throat or rake angle desired. It will hold all sizes, makes, and types of dies or chasers.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

**RELEASING BOX TOOL (N5)
SIMPLE TO SET UP**

Valley Tool & Supply Co. announces a new Cincinnati No. 2 releasing box (Continued on page 180)

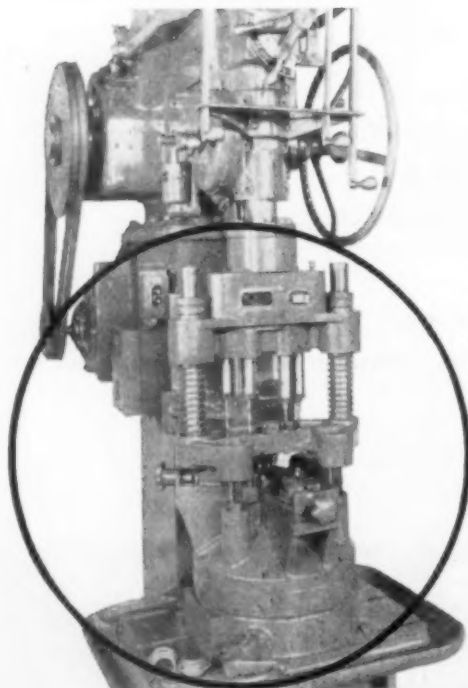


Releasing Box Tool

Buhr

CLOSES THE GAP

ON A
STANDARD DRILL PRESS
WITH A
COMPLETE TOOLING

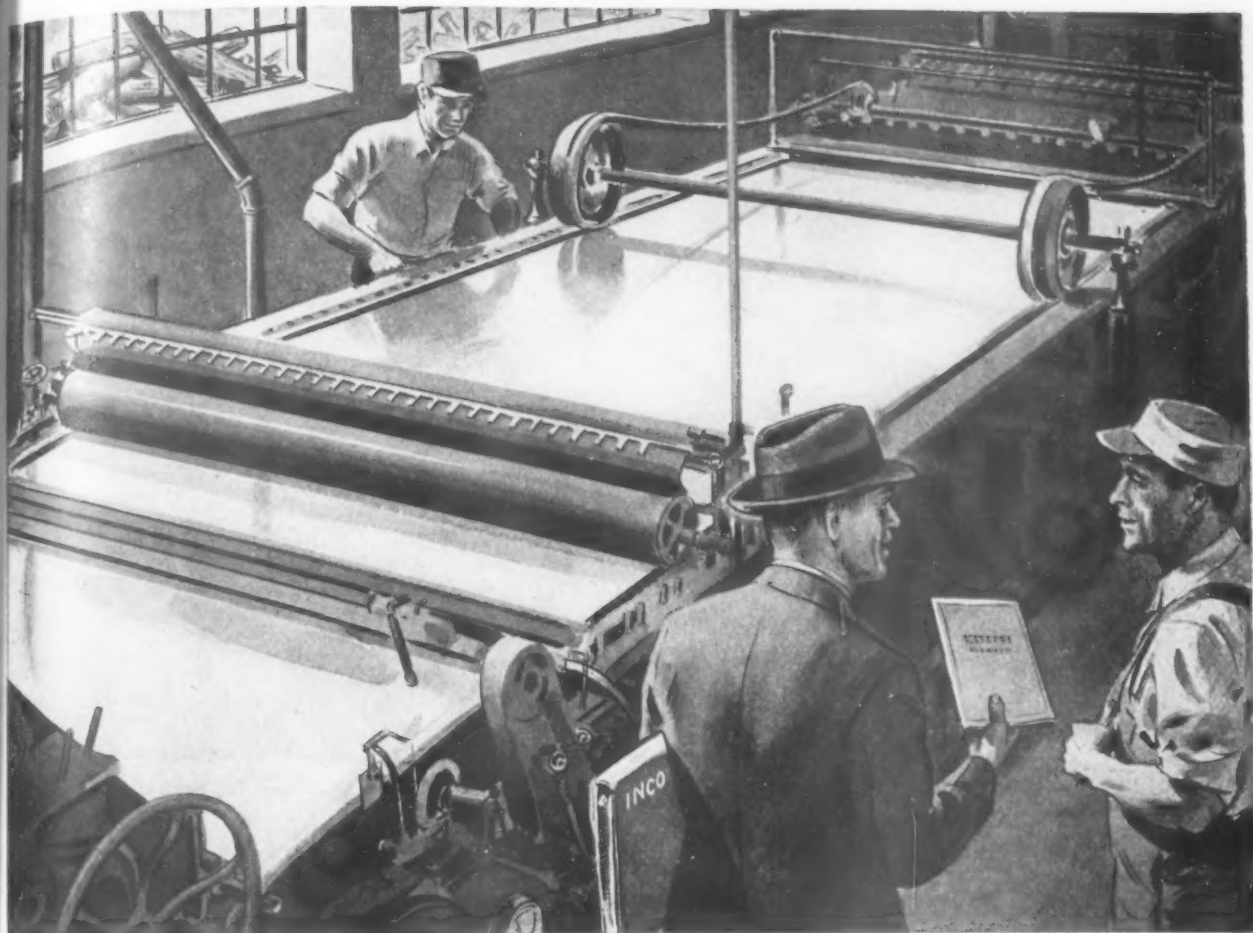


4-Spindle BUHR drill and ream Head with vertical adjustment in spindles Bushing Plate.

3-Place Holding Fixture mounted on a 14" Hand Index Table For drilling and reaming 2 holes in Connecting Rod Cap.

BUHR MACHINE TOOL CO.
833 GREEN ST. ANN ARBOR, MICH.

SPECIALISTS IN MULTIPLE SPINDLE DRILLING, BORING,
REAMING, TAPPING EQUIPMENT



NICKEL AIDS THE PAPER AND PULP INDUSTRY *to KEEP 'EM PRODUCING!*

"Paper is one of the sinews of war" . . .

A basic tool of communication . . . strategic substitute for metal in many products.

Made, for example, into new export containers that protect their contents against water, vapor, and grease, it's a vital factor in the Battle of Supply.

So the need is tremendous . . .

And the industry's vast output is possible largely because paper-making is almost entirely a machine process.

Plant engineers agree that when you depend so much on machinery, you'd better have machines that are dependable.

That is why . . . thanks to those engineers and the machine designers . . . equipment in paper and pulp mills in-

cludes large amounts of Nickel alloyed materials.

Metals so fortified help a lot to keep machines producing, because Nickel imparts toughness . . . strength . . . corrosion resistance.

Thus, when properly used in critical parts, "a little Nickel goes a long way" toward increasing dependability.

From grinder cylinders to dryer rolls, from digesters and save-all pans to Fourdrinier rails and beams, Nickel alloyed parts stand up better to abrasion, wear, and corrosive chemicals.

We have long enjoyed the privilege of cooperating with technical men interested in the selection, fabrication, and heat treatment of metals . . . not only in the paper industry but in many

others. Whatever your industry may be . . . if you'd like to have such assistance . . . counsel and printed data are available on request.

New Catalog Index

New Catalog C makes it easy for you to get Nickel literature. It gives you capsule synopses of booklets and bulletins on a wide variety of subjects—from industrial applications to metallurgical data and working instructions. Why not send for your copy of Catalog C today?

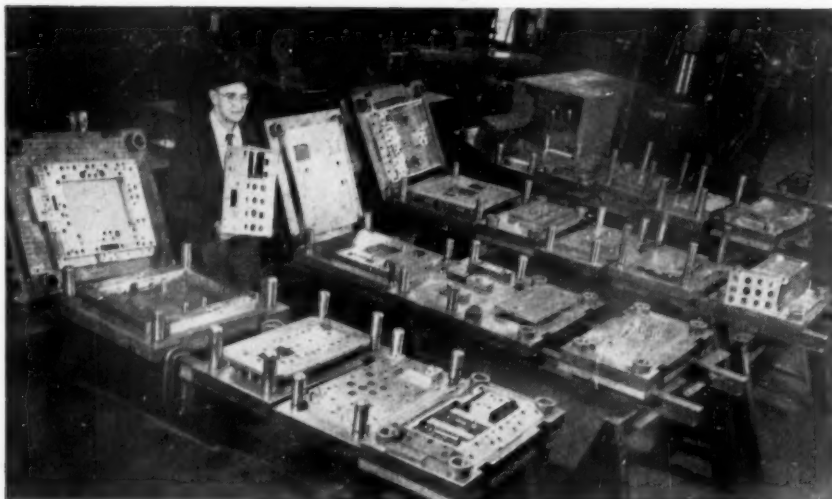


★ *Nickel* ★

THE INTERNATIONAL NICKEL COMPANY, INC., 67 Wall St., New York 5, N. Y.

FEBRUARY, 1944

179



From Parts Prints to Press in 8 Weeks



—No small task in these days of priorities, delays and last minute changes. Barth of Cleveland gives high credit to

"HARDSTEEL" DRILLS

which enabled them, on the signal equipment dies illustrated, to save many man hours and to keep an important delivery date. " " "

With a "HARDSTEEL" Drill in an ordinary drill press and following simple instructions regarding speed and pressure, any mechanic can easily drill clean holes through steel hardened by any process—40 Rockwell "C" or harder.

A time saver when last minute emergency changes come through on hardened dies and parts. And the only way to assure matching of hardened parts at assembly—drill after hardening.

Used throughout industry for parts recovery and for production work—made in all sizes 1/8" to 1".

BLACK DRILL COMPANY
1400 EAST 222nd STREET • CLEVELAND 17, OHIO

**"YOU HARDEN IT...
WE'LL DRILL IT"
with HARDSTEEL**

Complete information and practical operating suggestions in the "HARDSTEEL" Operating Manual.
Copy free on request.



"HARDSTEEL"
DRILLS • REAMERS • TOOL BITS • SPECIAL TOOLS

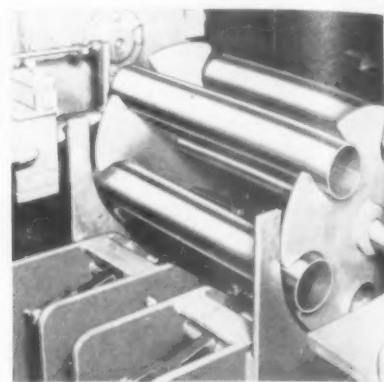
—NEW EQUIPMENT—

tool that can be set up by inexperienced help, using stock ground lathe tool bits. Made especially for use on turret lathes, the tool has a turning capacity of 1/4" to 1-1/8" diameter and 3" long. A retracting tool mechanism that draws the tool bit away from the turned stock leaves no mark and is controlled by an adjustment screw.

NEW AUTOMATIC REEL FEEDS TUBES AND RODS

(N6)

Pines Engineering Co. announces the addition of an automatic reel-type mechanism for handling tubes and rods in and out of the company's self-center-



Reel Feed for Rods and Tubes

ing type chucks on Pine profilers. The reel feed has increased production of Pines profilers from 600 to 1200 tubes per hour, the company states. It can be used with a chute and loaded by the operator at the cut-off machine.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

THREAD GAGE CHECKS LEAD AND DIAMETER

(N7)

Federal Products Corp. has introduced a thread lead inspection gage adjustable for thread lead and diameter.

The sensitive contact point floats freely laterally with the axis of the thread, assuring positive set between the sides of the thread. This contact motion is transferred through a sensitive mechanism to a dial indicator graduated to read in .0001".

The gage has capacity to accommodate threads up to 1 1/4" in diameter.

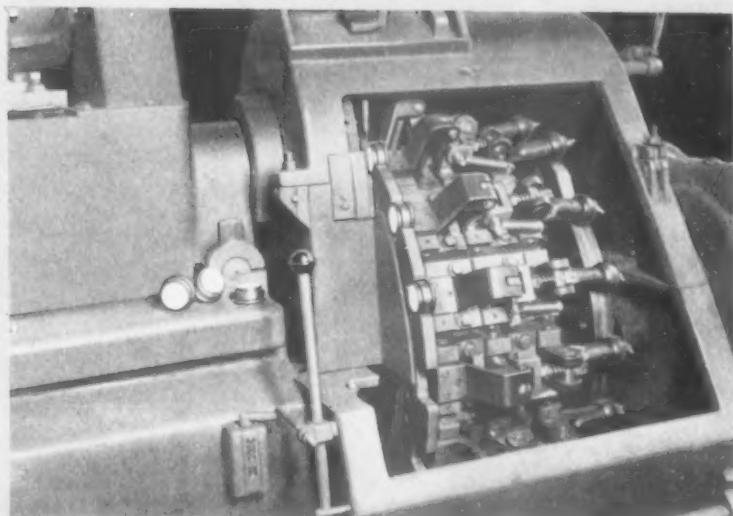
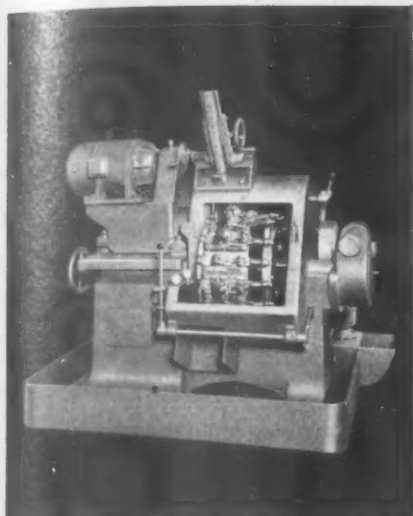
THE END



Federal Thread Lead Gage

THE TOOL ENGINEER

Grind your small flat surfaces *semi-automatically* - HERE'S HOW!



FOR a great many small single-surface operations — like the shell parts seen above, for example — a Gardner No. 122-20" Semi-automatic Grinder is the ideal solution.

Carrying either a rotary-type work carrier, as shown here, or a revolving drum upon which fixtures are mounted, this machine turns out excellent production, and close accuracies.

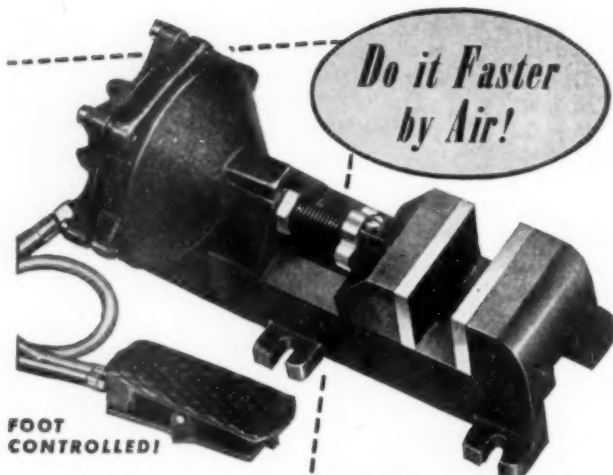
These shell parts are steel, and are loaded by hand into automatically-clamping work-stations, unloading by gravity. PRODUCTION: 20 to 25 pieces PER MINUTE, holding the ground face within .001" for parallelism, and .005" for uniformity.

Check the possibilities of this type of GARDNER GRINDER—
WRITE FOR FULL DETAILS!



GARDNER MACHINE COMPANY

442 East Gardner Street , , , Beloit, Wisconsin, U.S.A.



FOOT
CONTROLLED!

SPEEDY AIR VISE

GRIPPING FORCE 15 TIMES AIR LINE PRESSURE

• Speedy Air Vise helps workers get out more and better work—in less time! Foot control valve opens and shuts vise instantly, leaving both hands free to produce. Operates from air line or individual compressor, exerting a grip of 15 times air line pressure. Jaw opens up to 3 inches, easily fitted to hold castings, parts, jigs, etc. Speeds up every drilling, light milling, tapping and assembly operation. Compact, sturdy, trouble-free, low in cost! ***** Speedy Air Vise, complete with Foot Control Valve, Air Hose and Fittings, only \$24

Prompt Delivery from Your Supplier or Write Direct.

W. R. BROWN CORPORATION
5722 Armitage Avenue • Chicago 39, Ill.

AIR REGULATORS • AIR FILTERS • AIR GUNS • PORTABLE COMPRESSORS

THE UTILITY SLEEVE Removable Taper Shank TOOL DRIVER

CUTS SMALL
TOOL COSTS

SIMPLE,
POWERFUL,
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"LOGAN"

SURE FLOW

Centrifugal

COOLANT PUMPS

For

MACHINE TOOL APPLICATIONS

*Write For
Catalog 61*

LOGANSPOUT MACHINE, INCORPORATED
PAYSON ROAD
LOGANSPOUT, INDIANA
Manufacturers of Air & Hydraulic Devices, Chucks, Cylinders, Valves, Presses, Accessories



IDEAL SPEED LATHES

are performing secondary-finishing operations on small metal and plastic parts—more quickly, more accurately, at lower cost! Ideal for polishing, de-burring, lapping, filing. Quality engineered. Built for precision performance in continuous, 24-hour-per-day service!

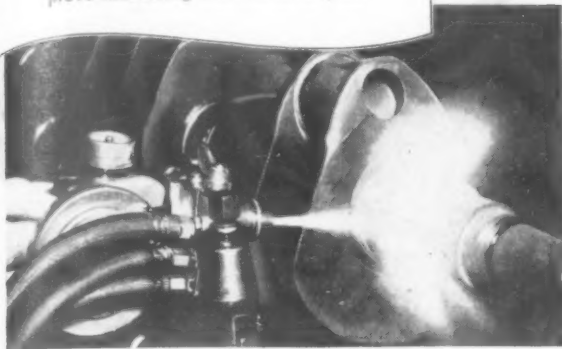
A size and type for every purpose. With air-cooled, dust-free single or two-speed motor; conventional or special holding devices; exclusive, automatic brake, etc. State your problem. Write for Catalog No. 440.

SCHAUER MACHINE COMPANY
ORIGINATORS OF TODAY'S SPEED LATHES
2046 READING ROAD ... CINCINNATI 2, OHIO

THE TOOL ENGINEER

Ingenious New Technical Methods

Presented in the hope that they will prove interesting and useful to you.



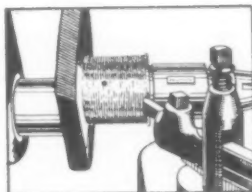
New Metal Surfaces Made by Spraying

Molten metal is now sprayed or atomized on to metal surfaces for the purpose of salvaging worn bearings, shafts, cylinder walls and such parts. Metallizing, as the process is called, is also used for putting a non-corrosive coating on iron or steel surfaces subject to corrosion such as cylinder walls of internal combustion engines, valve gates and such parts in contact with water. The metals to be sprayed may be aluminum, zinc, stainless steel, high carbon steel or other alloys depending upon the character of the surface desired. The sprayed surface may be "over built" and machined down to size to obtain accurate surfaces.

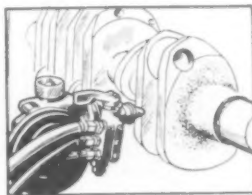
Metal spraying guns have been perfected for use with various types of gases for heat, depending upon the melting temperature of the metal to be sprayed.

We hope this has proved interesting and useful to you, just as Wrigley's Spearmint Gum is proving useful to millions of people working everywhere for Victory.

You can get complete information from the Metallizing Company of America, 1330 W. Congress St., Chicago, Illinois.



Rough threading—cooling locks metal firmly to surface, producing a permanently tight bond.



Sprayed journal before finishing—Main bearing journal after surface has been Metallized.

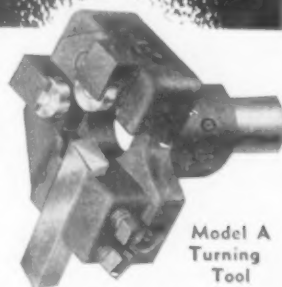
FULL SCREW MACHINE PRODUCTION *with* BOYAR-SCHULTZ TOOLS

The way to make sure of full screw machine production is to use the best tools available.

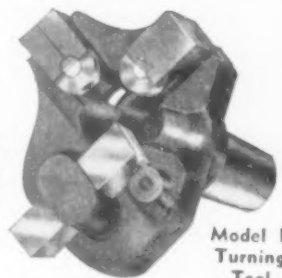
In Boyar-Schultz Screw Machine Tools you will find the desirable combination of accuracy, sturdiness and speedy operation that assures more piece parts, less rejections and less set-up time.

BOYAR-SCHULTZ CORPORATION

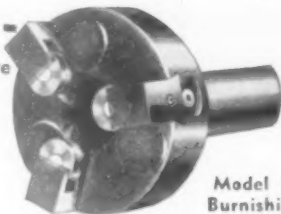
2116 Walnut St., Chicago 12, Ill.



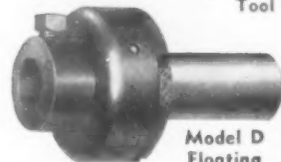
Model A Turning Tool



Model B Turning Tool



Model C Burnishing Tool



Model D Floating Toolholder



Model G Universal Grinding Fixture

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6327 W. Sixth St.,
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Davis Indus. Prod.,
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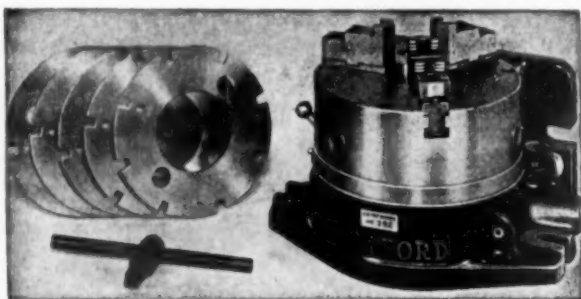
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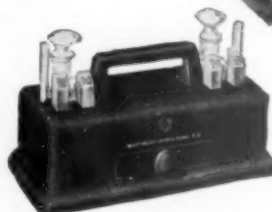
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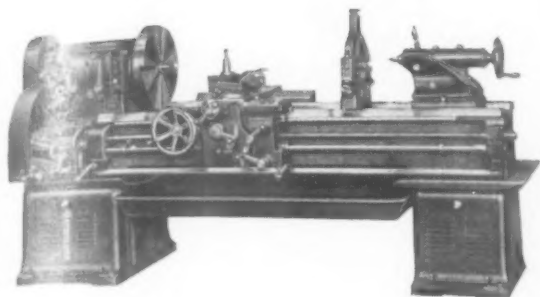
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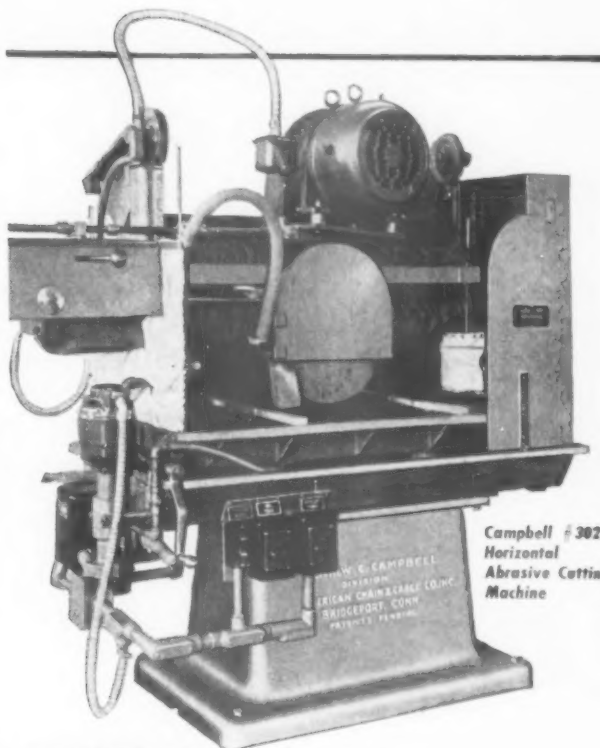
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According to WPB, the peak of the skilled labor problem has yet to come. • If you cut any of the annealed or unannealed steels, non-ferrous alloys, plastics, glass or ceramics—solid bar, tubular or flat stock—a CAMPBELL ABRASIVE CUTTING MACHINE will help you. • Tell the CAMPBELL Engineering Department materials, shapes, sizes, lengths before cutting, lengths of cut off pieces and hourly production required. They'll give you cost data and production procedure without obligation.

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NEW LITERATURE

T. M. REG. U. S. PAT. OFF.

OF INTEREST TO PRODUCTION EXECUTIVES

(954) Gages

American Gages & Tools. American Gage Co. This 4-page folder describes the precision gages and tools made by the company and includes information on thread checkers, hole checkers, amplifying gages, bench centers, dressers, and lapping plates.

(955) Hydraulic Presses

Designated as No. 320-A, a new bulletin has been issued by Watson-Stillman Co. covering its line of straightening and bending presses. It contains 38 pages of descriptive matter, illustrations, and tables of work capacities in addition to engineering tables and other technical data. Each of the ten standard Watson-Stillman presses is treated individually in separate chapters and is fully described.

(956) Abrasives

Coated Abrasives, 28 pages, Behr-Manning Co. Designed for use by buyers and users of coated abrasives, this booklet discusses coated abrasives, component parts, manufacture, and ultimate use. Also included is a discussion on how to store sandpaper.

(957) Milling Cutters

Farrel-Birmingham Co., Inc., has

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issued a new booklet describing Farrel Meehanite milling cutter bodies. The booklet describes advantages of design, tells why Meehanite is most suitable for milling cutters, and explains procedure for preparing cutter bodies for use and applying cutting tips. Tables of sizes, shapes, and dimensions for milling cutter bodies and single point tool shanks are included.

(958) Induction Heating

The Tocco Process, 32 pages. The Ohio Crankshaft Co. This revised 32-page booklet contains a comprehensive description on ramifications of induction heat treatment. It shows recent installations of the Tocco Process as well as various types of parts easily treated by induction.

Divided into chapters on heat treat application, the publication discusses induction hardening, heat treating, brazing and soldering, normalizing, and annealing and heating.

(959) Plastic Molding

Designated as Bulletin No. 5,000, a new booklet on hydraulic plastic presses has been issued by the Elmes Engineering Works. It describes the company's hand molding press, semi-automatic press, and transfer molding press, used for compression and transfer molding. Also included are descriptions of controls of the different presses, sources of power, construction, and a cross-section illustration of press operations.

(960) Marking Equipment

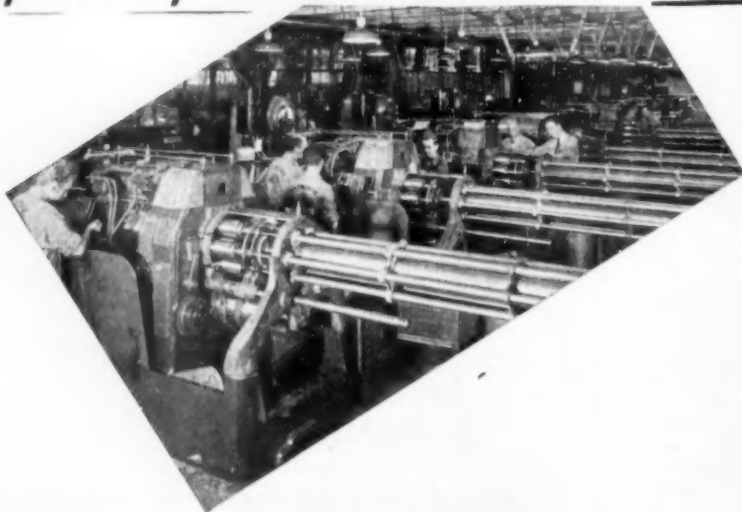
Metal Marking Equipment for Industry. Wm. A. Force & Co. This catalog illustrates and describes metal marking equipment made by the company. It includes material on hand presses, numbering heads, power presses, embossing heads, marking machines, knurling machines, special assemblies, steel taps and dies, steel type, and type holders.

(961) Grinding Equipment

Savage Tool Co. announces a new catalog describing the company's complete line of DoAll surface equipment, accessories, and supplies. It includes information on the company's three hy-

(Continued on page 188)

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MACHINING
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Where alloy parts must be used to gain high strength and wear resistance with minimum weight of metal, you can find the answer to your machining and fabricating problems in

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draulic grinders, grinding wheels, electro-magnetic chucks, wet or dry grinding attachments, and DoAll soluble oil for wet grinding.

(1962) Welding

Eutectic Welding Alloys has recently published a 36-page welding data book. It contains timely facts on low temperature welding for fabrication, salvaging and general maintenance in all types of war industries, hints on how to increase welding efficiency on all metals, and information on low cost salvaging of production tools. Also included is a special chart devised to simplify rod selection and use.

(1963) Standards

More than 600 standards are listed in the latest report of The American Standards Association. The standards cover specifications for materials, methods of tests, dimensions, definitions of technical terms, procedures, and similar information. The report is designed to serve as valuable reference material to engineers, manufacturers, purchasing agents, and other production men.

(1964) Metal Joining

Designed as a handy key for finding the best flux to use in connection with many metal-joining jobs, a flux chart has been published by Krembs & Co. In bulletin form, it is easy to use and handy for reference. It lists all common metals and alloys as well as many rare ones, and recommends the most

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satisfactory flux to use when joining them by different processes.

(1965) Grinding

Sav-Way Internal Grinder. This folder, printed in color, is issued by Sav-Way Industries and describes the company's model M-H-2 Internal Grinder. It contains a complete list of specifications and features.

(1966) Cutting Lubricants

Standard Oil Company of New Jersey has re-issued its bulletin, **Cutting Fluids**. Among the items included are photographs on various machine operations, subject matter on cutting oils and soluble oils, suggestions on the use of cutting fluids, machinability rating chart on SAE steels, AISI and NE steels, and recommendations for cutting fluid applications.

(1967) Heat treatment

Ajax Electric Co. issued a 4-page folder depicting various heat treatment operations performed by its salt bath furnaces. It illustrates the processes of cyaniding, neutral hardening, carburizing, tempering, annealing, and isothermal treatment.

(1968) Technical Literature

The Chemical Publishing Co., Inc. has issued a new catalog of technical books. It includes the latest publications on chemistry, technology, physics, general science, mathematics, engineering, radio, aviation, formularies, metals, technical dictionaries, and similar subjects. The catalog gives the date of publication of each book as well as a concise description and full table of contents.

(1969) Equipment Maintenance

Allis-Chalmers has announced a new bi-monthly publication, **Operation and Maintenance Review**. It contains maintenance tips from Allis-Chalmers engineers as well as timely articles on current trends for the shopman and executive. It also invites an exchange of ideas on operations and maintenance from equipment users.

(1970) Electronic Drive

General Electric Co. has issued a new 40-page bulletin designated as GEA-4025 describing the company's electronic drive for providing and controlling adjustable-voltage power from a-c lines, thus making possible the utilization of the inherent advantages of d-c motors.

The bulletin is divided into two parts. The first explains the Thy-mo-trol drive in detail and describes its functions. It also lists typical applications and uses on grinders, turret lathes, drill presses, conveyors, and form-and-

(Continued on page 190)

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BROACHING NEWS, Vol. 5, No. 4

(Right) One of the most flexible of machines, this Utility Press—one of the machine types referred to above—may be used for both broaching and other types of press work. It is thus well adapted to the requirements of the smaller or medium-sized shop as well as where higher production is required.



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Broaches  *Broaching Machines - Broaching Equipment*

thread milling machines. The second section contains technical information of the electronic drive's operation.

(971) Cutting Tools

Archer & Smith announces a cutting tool catalog containing data on standard flat carbide cutting-tools. In addition to listing the various standard tools available, the book also outlines the company's facilities for precision production on special cutting-tools made according to blue-prints furnished by the buyer. Also included is background material on the company's facilities and personnel.

(972) Milling

Sundstrand Machine Tool Co. announces a new publication entitled **Milling Small Parts on the No. 1 Hydraulic Rigidmil**. The material contains descriptive information and principal specifications of this machine.

(973) Diamond Tools

Diamonds in Industry. The November issue of this publication, issued by J. K. Smit & Sons, contains an excellent article on "Diamond Powder as a Lapping Compound." Written by R. H. Taylor, research engineer, it discusses the practical aspects and techniques involved in use of diamond powder for various lapping operations.

(974) Metal Cutting

Victor Saw Works, Inc. has just issued a combined technical instruction book and sales manual, listed as 43-V. It lists the entire line of hack saw

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blades made by the company and gives working specifications and operating suggestions for each type of blade for practically every kind of metal cutting operation. It also describes the company's flexible back band saw and outline band saw.

NEW BOOKS

Studies in Arc Welding. 1295 pages. The James F. Lincoln Arc Welding Foundation. Representing the work of more than a hundred engineers, designers, works managers, foremen, and other technicians, this book is published to provide engineering, technical, and trade schools and the welding industry generally with a solid backlog of authentic arc welding design applications and welding data.

The book should not be considered a primer of welding procedure, in that it does not deal with elementary principles of welding. Rather, it embodies studies and applications made by experts in the field, and each of the 98 technical papers which comprise the book, deals with a specific problem.

Containing more than 1,000 illustrations,

Studies in Arc Welding is divided into nine sections, each dealing with problems in a particular field, such as automotive, aircraft, and similar industries. Individual chapters deal with a specific arc welding application, such as welding of finished-machine castings, welding aircraft engine mounts, welding armor plate for tank production, and many other jobs.

Industries covered in the nine classifications are automotive, railroad, structural, watercraft, aircraft, furniture and fixtures, containers, and commercial welding. Studies involve designs, calculations, procedures, costs, materials, use of special equipment and fixtures.

Metals and Alloys Data Book. Samuel L. Hoyt. Reinhold Publishing Corp. \$4.75. Of interest to engineers, master mechanics, shop foremen, metallurgists, and other production men working with metals, this 334-page book offers a compilation of data on metals and alloys.

The work is intended to give information, not instruction, and presupposes a working knowledge of nomenclature and terminology on the part of the reader. It is comprised chiefly of tables, giving specifications of particular metals, such as hardness, composition, tensile strength, percent of elongation, yield stress, and other factors pertaining to the metal in question.

Chapters are devoted to hardness tests, wrought steels, test specimens, cast steels, stainless steels, cast irons, heat and corrosion-resistant casting alloys, non-ferrous alloys, miscellaneous metals, and general data. **THE END**

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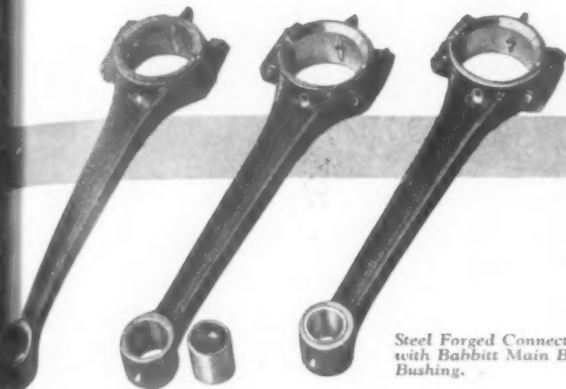
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32 SECONDS COMPLETE**

In the plant of this gasoline engine manufacturer, both wrist pin and main bearings in connecting rods are bored simultaneously on a No. 2U Stokerunit Simplex Two-Way Four-Spindle Precision Boring Machine. The two double-spindle ends of the machine alternate in the roughing and finishing operations.

Here is the interesting operating cycle in this installation, as handled by two operators:

FIRST SPINDLE—Rough boring babbitt bearing; stock removal $\frac{1}{32}''$. Also facing and chamfering one side of bearing.

SECOND SPINDLE—Finish boring wrist pin end of rod in steel forging (230 Brinell); stock removal .010''. Bore is .875'' dia. by 1'' long.

At this point, one operator removes the rod and presses in the bronze wrist pin bushing, while the other operator loads the machine for the initial operations.

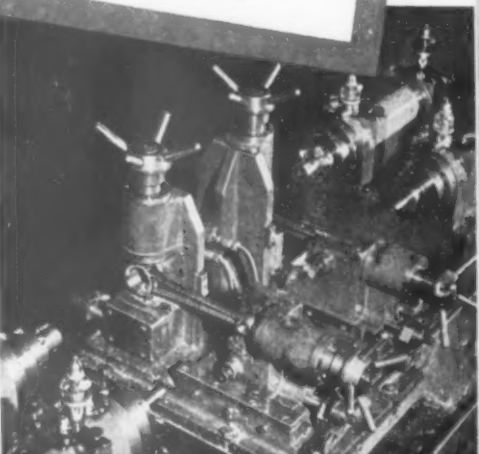
THIRD SPINDLE—Finish boring babbitt bearing; stock removal .005''. Bore is 1.752'' dia. by $1\frac{1}{8}''$ long. Also facing and chamfering other side of bearing.

FOURTH SPINDLE—Finish boring bronze bushing on wrist pin end of rod; stock removal .004''. Bore is .750'' dia. by 1'' long.

One operator now removes this completed rod and loads other end of machine for the final operations.

Special 3-Center Holding Fixtures for each end of the machine. The two ends alternate in the boring cycle, each end boring wrist pin and main bearing simultaneously.

Two operators maintain production of 70 connecting rods per hour. Actual boring time of each piece is 32 seconds complete.



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Tolerances of $\pm .0001''$ and better are consistently held in production with diamond tools for the babbitt bearing and bronze bushing. An extremely high finish is produced. Tungsten carbide tools are used for boring the steel forging.

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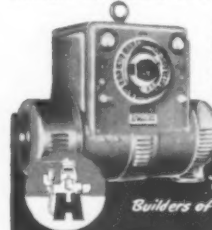
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Atlas

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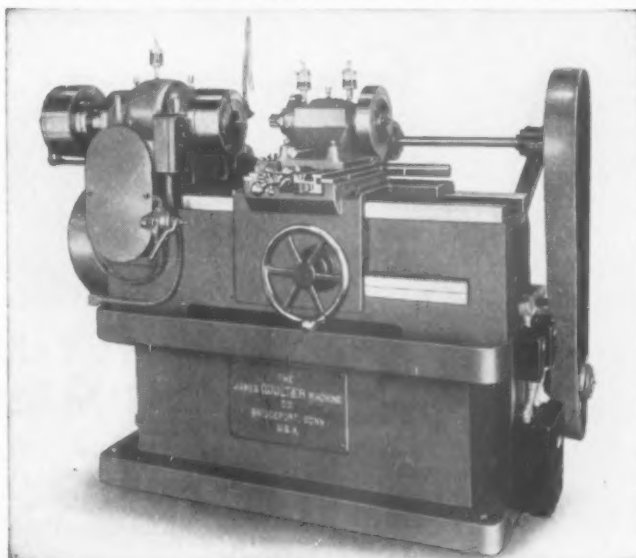


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*It pays to use
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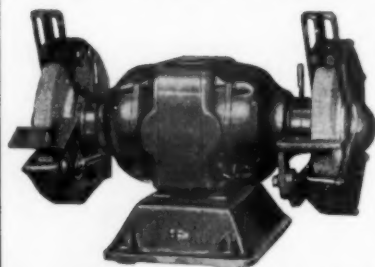
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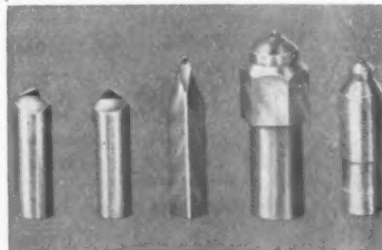
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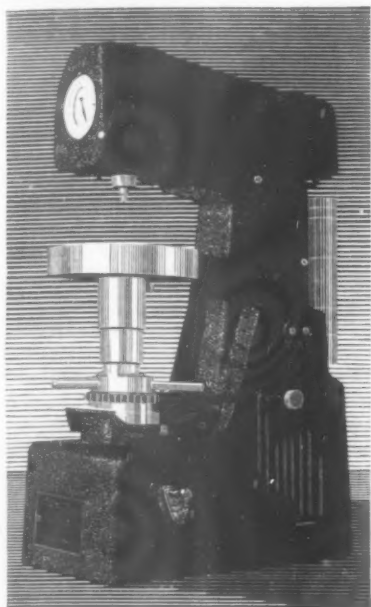
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HANDY ANDY

Says —

*T.M. REG. U.S. PAT. OFF.

JANUARY 14th marked my second bow before the Canadians, this time at Hamilton. As at Montreal, I was shown the fine courtesies and hospitality that seems ingrained in the folks north of the Border. Bill Dawson, of Otis-Fenton, met me at the station and, during my stay, drove me around town and up the mountain. From that eminence, a forty mile vista, with the city stretching like a ribbon below.

He also took me to a curling match, where Scotchmen in tams and local color played shuffleboard with what looked like granite ducks. Laddies with brooms ran ahead of the birds, sweeping away for dear life despite that there wasn't a speck of dust on the ice. Verra clean people, the Scotch, and I imagine the menfolk help the women a lot with the housecleaning.

A gathering of the Clan, in the suite, before the meeting, when I met the leading spirits of No. 42 along with the American vice-consul and ranking industrial executives from the Hamilton area. Then, down to the banquet hall, where ch'man Joe Little presided over

a fine dinner. Toasts to His Majesty and to the President of the United States.

A short business session, and an address by Len Singer, popular Canadian A. S. T. E. Director, after which Len introduced me in terms impossible of fulfillment. Between trying to live up to the build-up, and the handicap of my scrambled notes, I somehow muddled through my talk.

Bill Dawson, who followed, also sang my praises so lyrically that, when I got back to work, the Old Man wanted to know if I'd been down in Florida getting a sunburn. Bill, like Len Singer, is very popular in his neck of the woods, and we'll hear more of him. For that matter, they're all fine men, the Canadians, and I think it is time that the A. S. T. E. considered a Canadian as a member of the Executive Committee.

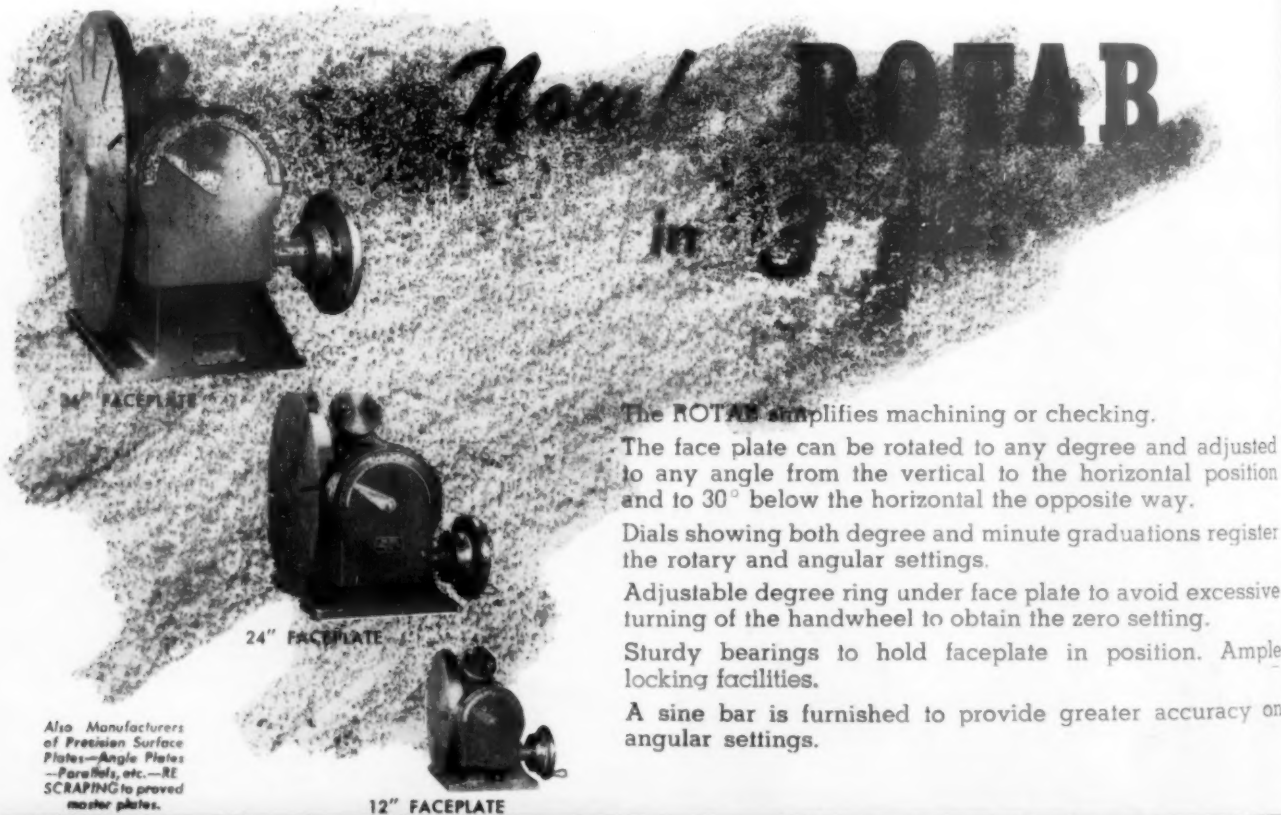
Back to the suite for libations, Scotch stories and good fellowship. To bed in the wee hours, a good sleep, some window shopping and a pleasant trip back to the States. Driving home

from the station, I Wrong-Way-Corriganed up a one-way street, walked one of Detroit's finest out of a 20 ticket. This public speaking pays dividends!

In this connection, however, I've warned all and sundry that I'm no orator. I can only make people think a painful ordeal that, like deciphering my handwriting, takes time for interpretation. Despite that, bids come in faster than I can accept them, although I've planned to visit Ft. Wayne come March.

It has been said by a High Authority that he who gives his life shall have it. Among other things, that implies the rewards that come from devotion to cause or duty rather than the final sacrifice. I got to thinking of that when, mentally reminiscing on the train, it occurred to me that I started to write for "The Tool Engineer"—then the "A. S. T. E. Journal"—some ten years ago. The Society was a babe in pinafores then, and the Journal little more than a folder when Roy Bramson took it over.

How Roy ever weathered the first lean years is beyond me. He probably wouldn't have but for the loyalty, devotion and encouragement of his wife, Ruth. Oh, a lot of us owe a lot to our women! Anyway, Roy burned the midnight oil and Ruth taught school and kept house, and strand by strand a shoestring grew into a powerful editorial fabric that covered a continent and, when the war interrupted, had (Concluded on page 198)



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The ROTAB simplifies machining or checking. The face plate can be rotated to any degree and adjusted to any angle from the vertical to the horizontal position and to 30° below the horizontal the opposite way. Dials showing both degree and minute graduations register the rotary and angular settings. Adjustable degree ring under face plate to avoid excessive turning of the handwheel to obtain the zero setting. Sturdy bearings to hold faceplate in position. Ample locking facilities. A sine bar is furnished to provide greater accuracy on angular settings.

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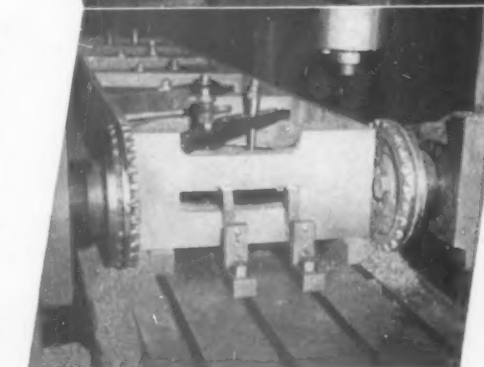
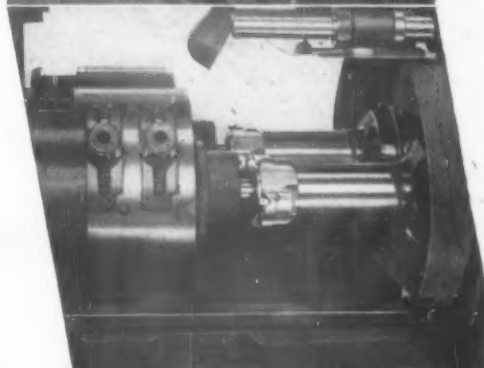
There are standard and special Lovejoy Cutters for every requirement—there are blades in stock for quick replacement service.



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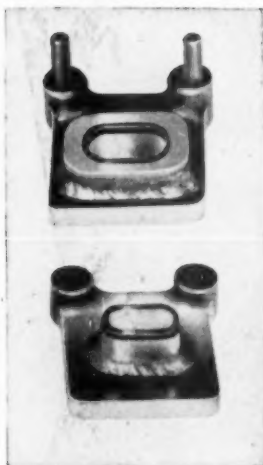




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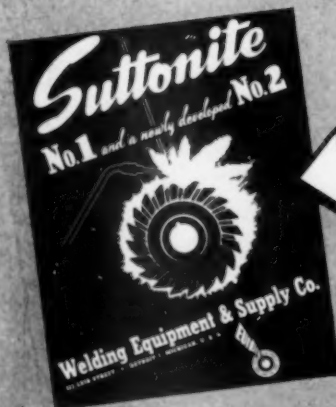
When peace again prevails, Eureka Electrodes will play an equally important part in industry by helping to speed up the reconversion for postwar manufacturing by saving valuable time in the composite fabrication of new dies.

Illustrations at left show fabrication dies with Eureka Tool Steel Electrode deposits used as cutting edges.

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IT TELLS ALL!

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—HANDY ANDY SAYS—

spanned the seas. Whatever rewards the Bramsons have accrued have been earned by the sweat of their brows.

I came on the scene through something I'd written, and shortly thereafter was appointed editorial chairman. Roy wanted something that would promote the Society, so, as an experiment, we launched the Handy Andy column. Somehow it went over, and we gave it everything we had. Remember the insistent slogans—"This is a friendly Society"; "The Tool Engineer is the key man in Industry". And so on, like a voice crying in the wilderness, "The Tool Engineer" went over the land, creating interest, preparing the ground for new Chapters. And the A. S. T. E. grew and grew.

It has been said of me that I'd make a good salesman provided I had faith in my wares. Well, I had faith in the A. S. T. E., and no doubt I've done my share in promoting it, even as, in an avocational capacity, I've had a hand in building up "The Tool Engineer." I've had faith in that, too, and the reward of service has been the pleasure of seeing it grow to ranking position in the technical field. And, one by one, there have come other if intangible compensations, rewards without price yet priceless. I've made friends.

It has also been said of me that, perhaps more than any other member, I've had my finger on the Society's pulse. At least, I've had an ear to its inner disturbances and, at times, the Column may have been instrumental in allaying its growing pains as well as in promoting its growth. The power of the pen, 'tis said, although, personally, I prefer the buttoned foil to the broadsword. It finds its mark, leaves no scars yet shows what the fencer could do were the buttons off. Better that than the less subtle whack of a battle axe.

Well, the foregoing is just a reminder that we have grown from humble beginnings. As a Society, we're getting to be great, but the great, like kings, are inclined to forget. Then, reminders may jolt one back into a sense of values; like the gyro compass, they keep the ship of state on its course.

In the beginning there was faith. There was also courage, as evidenced by the launching of the Society in the depth of the depression, and the staging of the first A. S. T. E. Tool Show when the assets of the Society were measured in the character and integrity of its sponsors rather than in dollars. We made promises that, however loosely phrased, were nevertheless as inviolate as the casual word of a western cattleman. I think we'll carry on that way.

Well, that's that—for now. Next month, we meet in Philadelphia, there to transact the business of Convention. My belief is that there will be no radical changes, only the steady, pace setting progress that has characterized the team during the past decade.

As for the Column, it will go on regardless of changes, an unofficial spokesman for the membership. And the member is the most important unit in the A. S. T. E. Let's not forget.

THE END

THE TOOL ENGINEER

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...BUT WHERE'S ONE* TODAY
WITH THE CAPACITY AND
KNOW-HOW FOR THIS JOB?"



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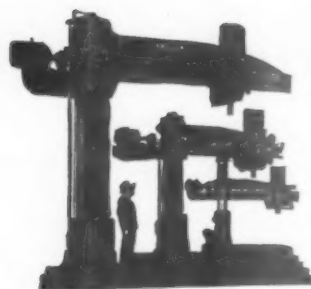
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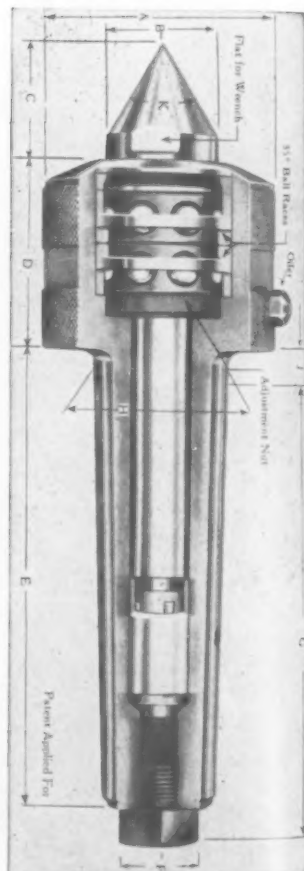
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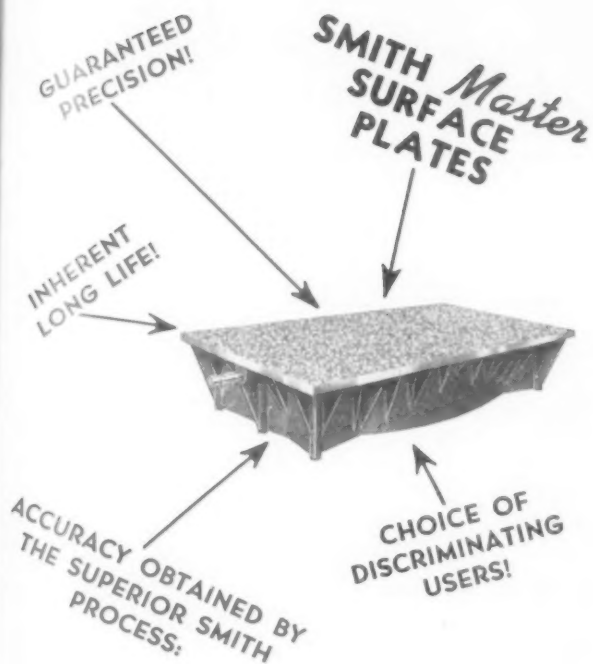


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For firmly gripping drills, keyway cutters and end mills, you can't beat Universal Collet Chucks. Universal Chucks don't mar tool shanks yet grip as strong as solid steel itself. The chuck shown here has National Milling Machine taper shank. Also available are Universal Standard, Floating, and Centering chucks. Write Universal today for complete facts.

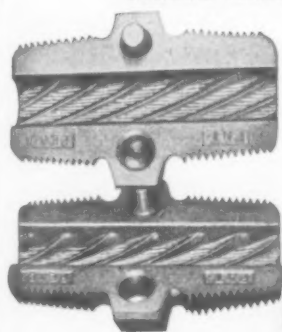


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A. S. T. E. DOINGS

• National Headquarters of the American Society of Tool Engineers: 2567 West Grand Boulevard, Detroit 8, Michigan. Telephone, TYler 5-0145. National Officers (term of 1943-1944): President, Ray H. Morris; 1st Vice-President, Douglas D. Burnside; 2nd Vice-President, C. V. Briner; Secretary, Earl V. Johnson; Treasurer, Floyd W. Eaton; Executive Secretary, Adrian L. Potter.

• For application blanks and information pertaining to membership in the American Society of Tool Engineers, address the Secretary's office, 2567 West Grand Boulevard, Detroit 8, Michigan. Senior initiation fee is five dollars. Dues, eight dollars per year for senior grade membership, and five dollars per year for junior grade membership. Junior initiation fee is two dollars.

Atlanta: W. L. Kennicott, representing Kennametals, Inc., was principal speaker at the monthly meeting held at the Piedmont Hotel, Jan. 5.

Mr. Kennicott spoke on "Super-High-Speed-Milling With Carbides." In addition to showing an up-to-date film on the subject, he gave a complete explanation of the machine and tool requirements necessary for high speed milling operations. Approximately 75 members attended the dinner and meeting.

Binghamton: Principal speaker at the Jan. 5 meeting held at Hotel Sherwood, Greene, N. Y., was J. C. Kelsey, Federal Products representative from Rochester, N. Y.

Mr. Kelsey spoke on gaging fundamentals and modern practice. He also presented a Federal Products film to illustrate the subject. Seventy-five members and visitors attended the meeting.

Boston: The gadget talk at the Jan. 18 meeting was given by Evert Tengbert, of the New England Carbide Tool Co. He displayed a high speed steel tool for truing grinding wheels.

Miss Mary Norton, metallographist, spoke on surface finish determination at the technical session. She cited results of experimental work, and stressed the need for setting up an American standard, based on the use of specimens which have proved practical.

Buffalo-Niagara: Approximately 400 members, wives, and guests attended the annual Christmas party held Dec. 16 at the Trap & Field Club.

Chicago: More than 200 members and guests turned out to hear Dr. H. A. Frommelt, director of research for Kearney & Trecker Corp., speak at the Jan. 10 meeting held at Huyler's Restaurant.

Dr. Frommelt presented a discussion of high-speed machining of metals, illustrating his talk with a color film. He showed numerous examples of actual production milling set-ups on the West Coast and time savings accomplished through them. It was announced that the chapter membership now exceeds 500.

Columbus: L. S. Martz, assistant to the president, Micromatic Hone Corp., was principal speaker at the technical session of the Jan. 11 meeting held at Hotel Fort Hayes.

Mr. Martz presented a film entitled "The Hone Abrading Process" and "More Than Machines." The film, which combines the two subjects in



Engineers and officials from the U. S. Naval Ordnance Plant at Centerline, Michigan, operated by Westinghouse Electric & Mfg. Co., were guests of the Detroit Chapter at the January meeting. James R. Weaver, manager of the plant, is a past A.S.T.E. president. Ray H. Morris, incumbent president, also attended the meeting and gave a brief talk.

one reel, has been adopted by the Army Air Forces for honing instruction use throughout the world.

Dayton: Forrest T. Ellis, consulting engineer for the Heald Machine Co., addressed the Dayton Chapter's first dinner meeting held at the Engineers' Club, Jan. 10. He spoke on "Borizing."

Mr. Ellis gave a brief history on the use of point tools in turning and boring, with the diamond as the first factor in the greater use of this method of precision production boring. He named sintered carbide as a major factor in the widespread use of single point boring and turning. His talk was illustrated with slides. Typical work done by Heald machines, and samples of "borized" work were displayed.

Decatur: L. R. Twyman, manager of the machinery products division of Vickers, Inc., was principal speaker at the Jan. 5 meeting.

He talked on the use of hydraulics in modern machinery. The address was illustrated.

Detroit: "Electronics At Work" was the theme of the Jan. 13 meeting held at the Fort Shelby Hotel.

James R. Weaver, manager of the U. S. Naval Ordnance Plant at Centerline, Mich., operated by Westinghouse Electric & Mfg. Co., and past national president of A. S. T. E., introduced W. B. Montague, Westinghouse district sales promotion manager, who directed the program. Principal speaker was Alfred Paulus, Westinghouse

district engineer, who talked on "Electronic Industrial Applications". His talk was illustrated by slides. A Westinghouse film, "Electronics At Work", illustrating and describing the functions of a vacuum tube also was shown.

Ray H. Morris, national A. S. T. E. president, was guest speaker at the meeting. He spoke on the progress of his administration. Twenty-two Westinghouse engineers from the Naval Ordnance plant, attended the meeting.

Erie: More than 90 persons attended the Jan. 4 meeting to hear Lou Lingler of the Sheffield Corporation, who was principal speaker at the technical session. Mr. Lingler presented a two-hour discussion of gaging.

Fond du Lac: At the technical session of the Jan. 14 meeting held at Benedict's Heidelberg Club in Sheboygan, Wis., Donald G. Williamson, of Physicists Research Co., spoke on "Recent Advances in Production Measurement of Surface Roughness".

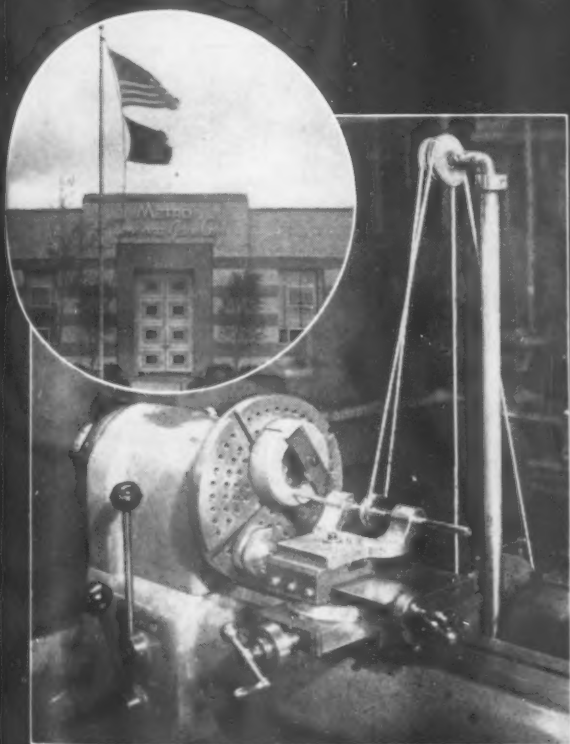
Mr. Williamson, inventor of the Profilometer, discussed and displayed his instrument which measures surface roughness in micro-inches. Also on the program was a talk by Rev. T. Perry Jones of Sheboygan, who presented his views on "Outlook For The Future."

Elmira: Jack Wilkinson, representing Henry Diston & Son, Inc., spoke on "Tool Conservation Control," at the meeting of Jan. 10 at the Mark Twain Hotel.

The sound film, "Mines Above" (Continued on page 204)

HARDINGE Precision Lathe Grinding a Precision Gage

at Metro Tool and Gage Co.
Chicago, Illinois



The HARDINGE High Speed Precision Lathe is being installed in ever increasing numbers in tool and die shops in the United States and Canada because they are well suited to a wide variety of work involving the precision limits in modern manufacturing.

The sustained accuracy of the HARDINGE High Speed Precision Lathe means dependability in operation.

Write for 16 page bulletin describing this machine and other Hardinge Precision Products.

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Ground," explaining methods used by Western Electric Co. to reclaim and re-use scrap metal, was shown. Also on the program was the presentation of two films entitled "Salvaging Waste Light for Victory."

Fort Wayne: Principal speaker at the Jan. 12 meeting held at the Chamber of Commerce, was Dr. Harry B. Osborn, representing the Tocco Division of the Ohio Crankshaft Co. He spoke on "Induction Heating at War Today and Peace Tomorrow." He showed a group of slides showing applications and types of equipment in actual use throughout industry.

Also on the program was a film entitled "The Hone Abrading Process" and "More Than Machines," shown by L. S. Martz, assistant to the president, Micromatic Hone Corp.

Greater New York: The regular monthly meeting was held Jan. 3 at the Hotel New Yorker. Principal speaker was Malcolm F. Judkins, chief engineer, Firth-Sterling Steel Co., who discussed "Making of Sintered Carbide Tip Tools and Their Maintenance." He also presented a sound film covering the entire manufacturing procedure of cemented carbide tools.

Hamilton: Approximately 83 persons attended the technical session held at The Welland House, St. Catharines, Ontario, Dec. 10. Principal speaker was R. Esch, assistant manager, Machinery Products Division of Vickers,

Inc. He spoke on "Hydraulics in Machine Tool Control and Fixture Operation." He illustrated his talk with lantern slides.

At the Jan. 14 meeting, 140 members and guests turned out to hear A. E. (Handy Andy) Rylander speak on "Engineering for Post-War."

Hartford: A. S. Keller, sales manager of Keller Division, Niles-Bement-Pond Co., gave an interesting and descriptive talk on the development and use of duplicators millers. He also presented slides showing applications of miller machines in industry.

Houston: The regular monthly meeting was held at the Y. M. C. A. Dec. 15, with 18 members present.

Included on the program was the showing of two 16 mm. sound films presented by C. H. Winston. The first was a captured German film dealing with long range bombing of Allied shipping in the early stages of the war. The second film showed the varied contributions of the Australian people to the present war effort.

Indianapolis: A record attendance of 147 was reported for the Jan. 6 meeting held at the Hotel Lincoln.

Principal speaker of the evening was J. S. Miller, plastic engineer of Durez Plastic and Chemical Co. Also on the program was the showing of three short color films of race scenes by Al Putnam former race driver and local member of the 500-mile race.

Kansas City: Coffee speaker at the Jan. 4 meeting was H. M. Gould representing the Liberty Welding Co. He suggested that A.S.T.E. be included among technical societies attending general technical discussions sponsored by his company.

Also on the program was a showing of the Micromatic Hone Co. film entitled "Automatic Honing" and "More Than Machines". The pictures illustrate automatic honing of aircraft engine parts, hydraulic cylinders and cylinder bores.

Lakehead: Jack Murie, a member of the program committee, led a discussion on "Research Engineer—The Forgotten Man In Industry," at the Jan. 13 meeting held at Fort William.

The discussion covered points of interest to tool engineers, including such topics as advance types of measuring instruments and methods of controlling heat in various metals.

Los Angeles: Speaker at the Jan. 13 meeting at Scully's was George B. Wallace of Standard Oil Co. He showed slides of various methods of testing petroleum.

Also on the program was presentation of films and slides explaining the application and use of gages, shown by Federal Gage and Supply Co.

Milwaukee: A. E. Kliebhan, representing the Industrial Diamond Co. (Continued on page 206)

*"Paid
for itself
in
6 weeks"*

IT'S THE **BLAKE** TAP GRINDER

This comment was made by a manufacturer who has a girl operating their Blake Tap Grinder on 1/2" 20 taps. The chances are, you too will find the Blake a profit maker in your own shop—not only by extending the life of every tap, but, by keeping taps sharp, machine efficiency is improved and less spoilage and broken taps result.

The Blake Grinder will sharpen the chamfer on right- or left-hand taps with 2, 3, 4, 5, 6, 8 or 10 flutes. Capacity—No. 0 to 2". Mail the coupon for full details.

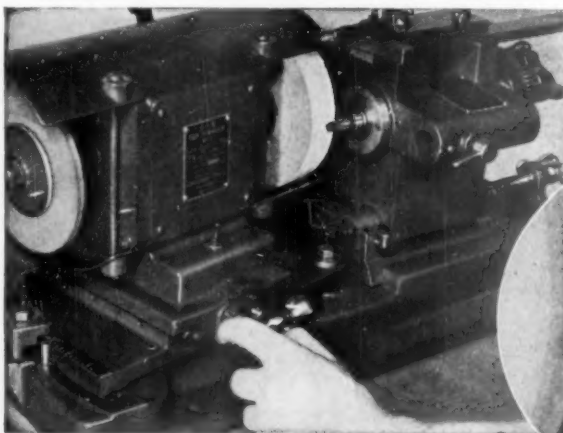
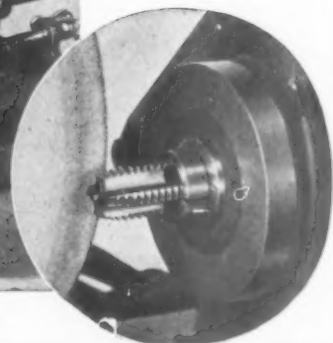


Photo at right shows tap held in Blake bushing



Please send folder giving complete details on the Blake Tap Grinder.

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634 COMMONWEALTH AVE., NEWTON CENTRE, MASS.

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OPERATORS ARE TRAINED

Quickly

TO SECURE

$\pm .0005''$ ACCURACY

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Wickman

**PROFILE
GRINDER**



**TYPICAL EXAMPLES OF WORK
GROUND AND INSPECTED ON THIS
MACHINE WITHOUT USE OF RADIUS
DRESSER OR FORMED WHEEL**

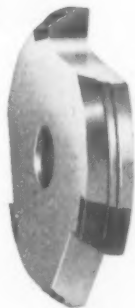
The Wickman Profile Grinder is a machine which makes possible substantial savings in machining time. It produces extremely accurate work, tolerances even closer than $\pm .0005''$ being secured with reasonable care in operation.

Of most importance, these production advantages can be effected in your plant with relatively unskilled operators assigned to the machines. Any person of average intelligence can be trained in a very short time to become thoroughly efficient in the Wickman method of profile grinding.

The layout and brain-work are done in the drafting room. The operator has nothing to measure. She sees it done. She knows at all times where every point on the contour is, during its development, in relation to every other point on the tool without removing it from the machine for partial inspection. Write for completely descriptive literature.



Cemented-Carbide Tipped Form Tool
Width of Carbide Tip $1\frac{3}{4}''$
Stock Removed approx. $.040''$
Grinding time including set-up and complete inspection of contour before removal from machine $3\frac{1}{2}$ hr.



Circular Form Tool with Preformed Cemented-Carbide Tips
Stock Removed $.015''$
Grinding time including set-up and complete inspection before removal from machine
approx. 2 hrs.

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DETROIT, MICHIGAN

of Detroit, spoke on "Industrial Diamonds—Their Use in Industry" at the Dec. 16 meeting held at the Wisconsin Hotel. He illustrated his lecture with several demonstrations on a diamond cutting machine.

Montreal: Ed. Barker, president of Modern Tool Works Ltd. Toronto, addressed the Jan. 12 meeting held at the Windsor Hotel.

He gave an interesting talk, illustrated with slides on "Modern Machine Tools—Trend and Design." His address covered the evolution of machine tools in the past 200 years, and made some predictions for the future. Also covered in the talk was the use of modern hydraulic controls on milling machines.

New Haven: Phillip M. McKenna, president of Kennametals, Inc., was principal speaker at the technical meeting held Jan. 13 at Hotel Duncan.

Mr. McKenna spoke on "Cemented Carbide Tools for Steel Cutting." He covered latest developments in milling of steel aircraft parts with carbide tipped milling cutters and presented a film showing design and application of steel cutting carbide tools embodying chip breakers. Also on the program was a complete demonstration of the brazing of carbide tools.

Peoria: Speaking on tool cutting design and methods of grinding to speed up production, H. M. Huffman, field engineer for the grinding department

At the Peoria Jan. 4 meeting: Left to right — H. F. Huffman, technical speaker; Van W. Joslin, chairman; Adrian L. Potter, national executive secretary; Carl A. Holmer, director, Region 15.



of the Cincinnati Milling Machine Co., addressed the meeting held Jan. 4 at Hotel Jefferson. He illustrated his talk with slides.

Adrian L. Potter, national executive secretary, revealed plans for a post-war show of machinery and equipment and for a tool engineers' handbook. Carl Holmer, Caterpillar Tractor Co. engineer and regional A. S. T. E. director, was presented with a past chairman's emblem.

Philadelphia: William J. Meinel, president Heintz Mfg. Co. of Philadelphia, addressed the Jan. 20 meeting at the Engineers' Club. He spoke on "Better Tooling Offers A Larger Market In The Post-War Period."

Also on the program was an address by C. Newbold Watson, representing the Standard Oil Company of Pennsylvania, who talked on "Bombs for Ber-

lin—Terror in Tokyo—Tires for You."

Pittsburgh: Ray H. Morris, national A. S. T. E. president was principal speaker at the Jan. 7 meeting held in the Hotel Henry.

He reported that industry's change-over from war production to civilian operation already is under way. He pointed out that a gradual conversion to normal production has been taking place since last August. He stated also that there is still much work to be done by tool engineers who must keep plant machine tools and equipment geared to changing conditions of war.

Also present at the meeting were national vice president D. D. Burnside, national secretary Earl V. Johnson and executive secretary, Adrian L. Potter. Regional director William Gamble, also addressed the meeting.

(Continued on page 208)

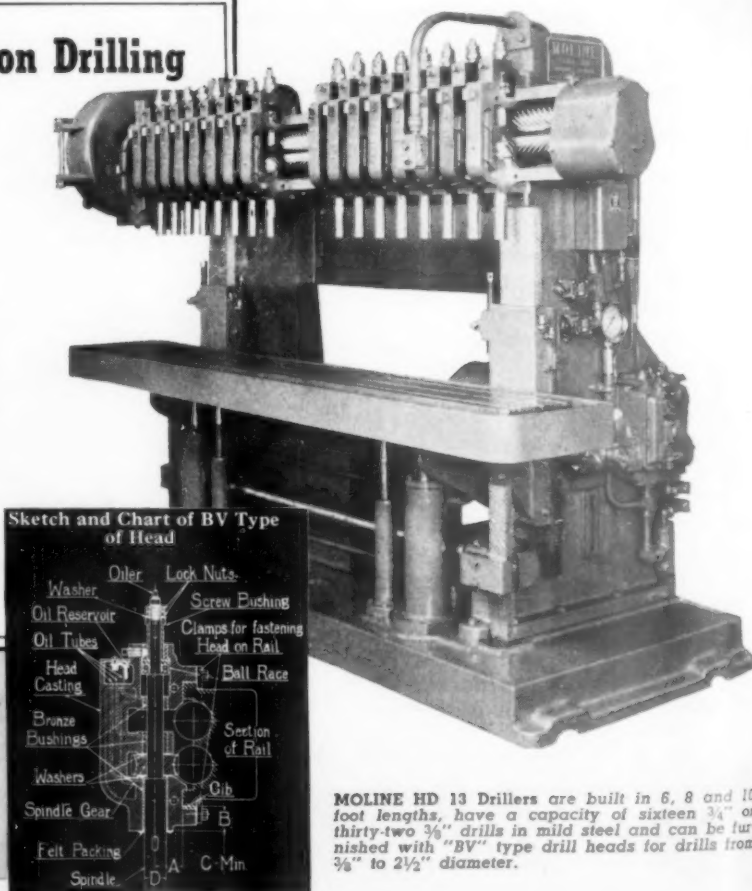
For Straight-line Production Drilling

of medium heavy castings, pipes, channels, angles or plates.

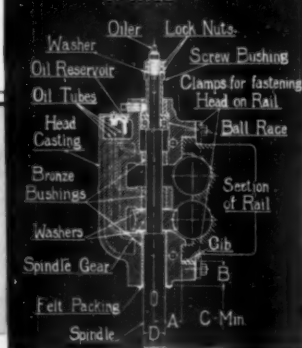
MOLINE HD 13 Drillers are unsurpassed for long-run production work, but can be changed over quickly and easily for new jobs—by simply respacing, removing or adding spindle heads on the rail, by selecting drive gears for correct rate of spindle rotation, and by adjustment of the electric push button controlled automatic feed cycle. The feed of the T-slotted table is actuated hydraulically and is equalized from end to end of the table by rack and pinion mechanism. The table is T-slotted for fixture mounting and positive stops can be provided for drilling or spot-facing to exact depths as well as jump feed feature for drilling tubular shapes.



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Sketch and Chart of BV Type of Head



MOLINE HD 13 Drillers are built in 6, 8 and 10 foot lengths, have a capacity of sixteen $\frac{3}{4}$ " or thirty-two $\frac{3}{8}$ " drills in mild steel and can be furnished with "BV" type drill heads for drills from $\frac{3}{8}$ " to $2\frac{1}{2}$ " diameter.

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WEBBER GAGE BLOCKS



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Webber Gage Blocks are furnished in "A" accuracy sets tested to .000004 inch and "B" accuracy sets tested to .000008 inch.

Prices as follows:

Set No. 84A — \$350.00	Set No. 84B — \$235.00
Set No. 43A — \$185.00	Set No. 43B — \$150.00
Set No. 38A — (Thin Blocks) \$195.00	
Set No. 38B — (Thin Blocks) \$155.00	

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Potomac: Frank W. Curtis, consulting engineer for Induction Heating Corp., New York, and past A. S. T. E. president, was principal speaker at the Jan. 6 meeting held at the Mayflower Hotel.

He spoke on mechanical requirements of high-frequency induction heating as applied to heat treatment and hardening of steels, as well as for joining metal and metal parts by brazing and soldering.

Also included on the program was a movie entitled "Victory in the Bismarck Sea" dealing with a recent Allied victory.

Racine: Principal speaker at the Dec. 20 meeting was Axel Lundbye, engineer for the Crowell-Collier Publishing Co. and founder of the Lundbye process of chromium plating for cutting tools.

Following his address, Mr. Lundbye conducted an open forum discussion. Also on the program was a sound movie on die casting. Attendance was 115 members and guests.

Rochester: Burton E. Middleton, district manager for Kennametal, Inc., was technical speaker at the Jan. 11 meeting, held at the University of Rochester.

Approximately 115 members and guests turned out for Mr. Middleton's talk on carbide cutting tools up through the ages, a thorough comparison with high speed steel, and the complete and proper design of carbide as used on metals and operations today.

Also on the program was an address by H. J. Martin, personnel director of Todd Company who discussed his problems and success in the use of mental, mechanical and "I. Q." tests, in hiring and placing personnel.

Rockford: Sleeping on air, wearing glass clothes, and building houses of agricultural lumber from corn stalks were among subjects discussed by Dr. Hilton I. Jones at the Jan. 6 meeting at the Faust Hotel.

His address, "Peeps at Things to Come," was a resume of the latest development in the field of chemistry. He also demonstrated the manufacture of synthetic rubber and the use of other synthetics, such as nylon, plastics, and spun glass. Approximately 250 tool engineers attended the meeting.

St. Louis: L. R. Twyman, manager of Machinery Products Division of Vickers, Inc. was principal speaker at the Jan. 6 meeting held at the Hotel Melbourne.

Mr. Twyman spoke on "Hydraulics as Applied to Machine Tools." An informal discussion followed his address, which was illustrated.

San Diego: W. F. Asmus, director, Region 18, presented a report on semi-annual A. S. T. E. meeting at the Jan. 14 session, held in Normal Heights Methodist Church.

Speaker at the technical session was D. H. Ruhnke, metallurgist, Republic Steel Corp., who spoke on "Alloy

Steels". The discussion, which was illustrated, covered a brief outline of early developments of alloy steels, other than tool and stainless steels, functions of major alloys, and applications, particularly in regard to present aircraft engine and airframe production, in National Emergency steels.

Seattle: With 56 members and four guests present, the regular monthly meeting was held Dec. 14 at Jorgensens Restaurant.

S. M. Clark, secretary, announced plans for a Los Angeles Tool Show to be held in the near future. Charles Quinn, Radioman 1st Class, told of his experiences on Bataan before and after December 7, including his escape in a submarine from three Jap destroyers.

Schenectady: Principal speaker at the meeting held in Ten-O-One Hall, Scotia, New York, was Burnham Finney, editor and publisher of the "American Machinist."

Mr. Finney discussed industrial conditions at the present time and after the war. He covered industrial development that has taken place since he last addressed the chapter in 1939.

South Bend: Ray H. Morris, A. S. T. E. president, spoke at the Ladies' Night program Jan. 11 at the Indiana Club.

Mr. Morris warned against overconfidence in the war and discussed problems that confront tool designers because of changes in material.

(Continued on page 210)

TESTS PROVE

That This Universal Tapping Machine Affords:

1. GREATER SENSITIVITY
2. INCREASED OUTPUT
3. LESS TAP BREAKAGE

Actual comparative tests in shops by users of Procnier Tapping Machines prove that these machines definitely speed up tapping operations, do more accurate work and reduce tap breakage. There are specific reasons for this superior performance of Procnier machines: 1. The improved Procnier tapping head with double-cone cork-face friction clutch and other exclusive features; 2. Four speeds, ranging from 390

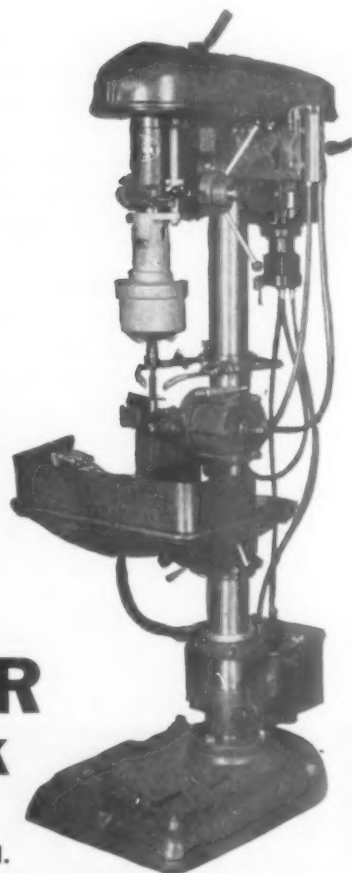
to 2050 RPM, efficiently handle jobs for which conventional high speed tapping machines are inadequate; 3. One machine handles tap sizes from No. 2 to 1/2" through two interchangeable heads; 4. Extra long Spiral Compensating Springs conveniently located, with wide range hand screw adjustments, maintain pre-set tap feeding and reversing pressure INDEPENDENT OF OPERATOR.

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A DRILLING MACHINE WITH FLEXIBILITY

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Write us today for complete information on vertical and horizontal units from 1 to 20 H.P. with strokes up to 24".

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ENGINEERS AND BUILDERS OF PRODUCTION MACHINES

Springfield: The Annual Executives' Night meeting was held in the Highland Hotel, with 133 members and guests in attendance, Dec. 13.

Toastmaster A. H. d'Arcambal, past A. S. T. E. president and a vice-president of Pratt & Whitney Div. of Niles-Bement-Pond Co. introduced Ray Morris, A. S. T. E. president who gave an outline of recent activities of national headquarters and forecast future activities.

Alfred C. Fuller, president of the Manufacturers' Association of Connecticut, gave an address on man-power problems and post-war planning. Also on the program was a talk by John S. Begley, deputy chief of the Springfield Ordnance District, who outlined functions and operations of the procurement department.

Toronto: Ed Barker, past chapter chairman and president of Modern Tool Works, spoke on "Machine Tools—Past and Present, and Future Trends" at the December meeting.

He showed slides of early tools, from the cave-man's bow drill and Mawdsley's early lathe to the present large wheel lathes and automatics, in addition to many other illustrations of tool evolution. The talk covered thread millers, thread grinders, profile grinders, spline hobbing, gear shaping, and the future possibilities of hyper milling, broaching, profile milling electronic controls, refrigerated coolants, and many other developments.

A. S. Johnston, president of Barnes

Drill Co., was technical speaker at the January meeting at Malloney's Gallery. He talked on "Honing and Drilling."

He illustrated his talk with moving pictures showing honing operations on aircraft propellers, aircraft engine blocks, gun barrels, and on diesel engine cylinders 18" diameter and 48" long.

Tri-Cities: Harry Gotberg, chief engineer in charge of machine design at Colonial Broach Co., was principal speaker at the Jan. 5 meeting at Le-Claire Hotel in Moline, Ill.

His talk included up-to-date material on broaching methods and was illustrated with lantern slides, and movies some of which showed actual machine operations. Also present as guest was Arvid Lundell, of Colonial Broach Company. The coffee talk was given by Raymond Henry, owner of Henry Engineering Co., who spoke on "Junk Rubber Helps Fight The War."

Twin States: Nearly 100 members and guests attended the January meeting held at the Windsor House in Windsor, Vermont.

Ernest Flanders of Jones & Lamson Machine Co., chairman, introduced Bradford Reed, president of Roll Thread & Die Co., who was principal speaker. Mr. Reed's subject, "Thread Rolling," was prefaced by a short summary of thread rolling history and background, starting with the invention of rolling in 1838.

He showed slides, illustrating various phases of thread rolling production. He pointed out that the thread rolling process reduces by 20 per cent the loss of material, since no chips are removed. Also on the program was the showing of a Carborundum Co. film entitled "Abrasives In Industry."

Western Michigan: Technical speaker at the Jan. 10 meeting, held in the social room of Park Congregational Church, was A. F. Hasty, district manager of The Sunnen Products Co.

Mr. Hasty gave an interesting and instructive talk on "Honing for Size and Quality." His address was illustrated with slides and production parts. An interesting exhibition of parts showing high quality of finish on honed surfaces and close tolerances, was on display.

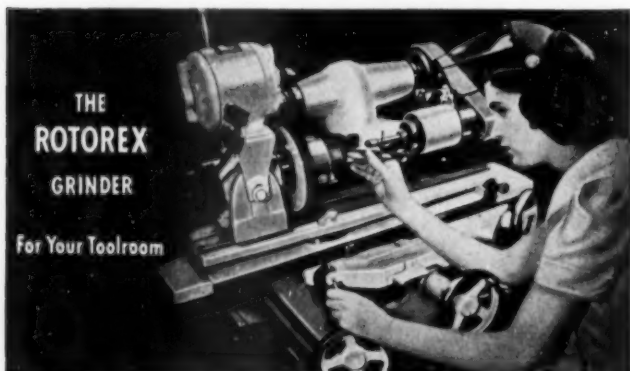
Worcester: Approximately 125 persons attended the Father and Son meeting held Jan. 4.

Mr. Siecke, consulting engineer of Merritt, Chapman and Scott Corp. and engineer in charge of raising of the "Normandie," told about the operation and illustrated his talk with slides.

Also on the program was the showing of two color films one on "Rail-roading" and the other on "Lightning" loaned to the chapter through the courtesy of General Electric Co.

H. M. Haffman, Cincinnati Milling Co., will address the February meeting.

(Concluded on page 212)



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INCREASED FACILITIES enable us to make PROMPT SHIPMENTS

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Easy interchangeable attachments for faster set ups, selective speed range from 3000 to 6000 rpm are outstanding features.

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- ★ Wear Better—Last Longer
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 - 90° double angle
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• Where cutting speeds must be increased to keep pace with modern methods, Scully-Jones and Company standard tungsten carbide and Haynes Stellite tipped tools effect substantial savings by increasing production, giving better finish, longer tool life with less regrinding, and lower cost per unit produced.

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— A. S. T. E. DOINGS —

FEBRUARY MEETINGS

Fond du Lac: Feb. 11. Subject will be "Plastics."

Fort Wayne: Feb. 9. Elections. Members only.

Golden Gate: Feb. 8, Engineers' Club. George H. Sanborn, Fellows Gear Shaper Co., will talk on "Gears at War."

Hamilton: Feb. 11, Royal Connaught Hotel. C. D. Wright, chief tool engineer, McKinnon Industries, Ltd., will talk on "Gaging Systems."

Hartford: Mar. 6 Earl Daugherty, service engineer for Whitman and Barnes, will speak on "Twist Drills and Reamers."

Houston: Feb. 15. Subject: "Gears at War." Speaker, George H. Sanborn, Fellows Gear Shaper Co.

Los Angeles: Feb. 10. Subject: "Gears at War." Speaker: George H. Sanborn, Fellows Gear Shaper Co.

New Haven: Feb. 10, Hotel Duncan. Speaker: G. Dupernell, representing United Chromium, Inc.

North Texas: Feb. 16. George H. Sanborn, Fellows Gear Shaper Co., will talk on "Gears at War."

Peoria: Mar. 7. George H. Sanborn, Fellows Gear Shaper Co. will talk on "Gears at War."

Rockford: Feb. 3, Faust Hotel. High speed steels will be discussed by Mr. Kells, chief service engineer, and Mr. Grimshaw, metallurgist, both of Latrobe Electric Steel Co.

San Diego: Feb. 11. Speaker will be George H. Sanborn, Fellows Gear Shaper Co., Subject: "Gears at War."

Schenectady: Feb. 10, Watervliet Arsenal. Dr. H. A. Frommelt, Kearney and Trecker, will speak.

Syracuse: Feb. 15, Hotel Syracuse. Closed meeting. Elections. Subject: "Tooling for Present and Post-War Projects." Mar. 7 meeting will feature Earl Daugherty, service engineer for Whitman and Barnes. He will talk on "Twist Drills and Reamers."

WILSON versus WILSON

To many readers of industrial news, Charles E. Wilson is a confusing and ubiquitous individual who pops up in connection with General Motors, General Electric, WPB, and Worthington Pump and Machinery Corporation.

Here is the explanation: Charles Edwin Wilson of G. M., and Charles Edward Wilson of G. E. also present executive vice-chairman of WPB, are presidents of their companies. Likewise, Charles Eben Wilson heads Worthington Pump. And just to add to the mixup, G. E. has an additional Charles Edward Wilson, an engineer.



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IN WAR plants all over the country, Profilometers are at work measuring the roughness of machined surfaces—on aircraft engine parts, shell dies, bearings, and thousands of other parts that go into the machines with which we wage war.

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In time of war, control of surface finish is of utmost importance. Time is short . . . the highest production must be maintained. Materials are scarce . . . waste must be kept at a minimum. The Profilometer is helping to meet these requirements.

☆ Profilometer inspection on intermediate finishing operations will greatly facilitate final finishing of the part to specified dimensions.

☆ Profilometer readings will show whether parts meet surface-roughness specifications.

☆ Profilometer inspection can prevent waste of valuable time incurred by finishing parts beyond specifications.

☆ Profilometer inspection can prevent waste of materials through needless scrapping of rejections that can be reworked.

Thus has the Profilometer proved its value in war-production inspection in the saving of materials, time, and money. There is a moral here, too, for postwar planners.

What is the Profilometer?

The Profilometer is an electronic instrument which indicates the average roughness of a surface in microinches (millionths of an inch).

The Profilometer is a rugged self-contained, production instrument designed for use in the shop.

Profilometer readings are given directly on the dial of a meter—no computations by the operator are needed.

With the Profilometer, any workman, with a minimum of training, can obtain accurate and consistent measurements.

The Profilometer with the Tracer supplied as standard equipment will measure a large majority of all machined, ground, and finished surfaces. Numerous accessories are available for measuring in small holes and slots, on gear-teeth, and other hard-to-reach surfaces.

Inquiries regarding your surface-roughness measuring problems will receive prompt attention.



We will be pleased to send you a copy of our recent booklet *Practical Measurement of Surface Roughness*, a non-technical discussion of surface-roughness measurement with a description of the complete Profilometer equipment.

*Profilometer is a registered trademark indicating Physicists Research Company's brand of surface-roughness gaging equipment.

New Fixture Aids Roughness Measurement of Piston Rings

The production measurement of piston-ring surfaces is facilitated by the Type R Piloting Fixture recently developed by Physicists Research Company. For use with the Profilometer, the new fixture enables surface-roughness measurement of the side surface of all types of rings, including keystone rings.

The fixture consists of a modified surface plate in which are incorporated means of rotating the ring and reciprocating the Tracer on the ring surface. When the fixture is turned on, the Tracer is automatically advanced and its point set on the ring surface to obtain a reading. Reversing the switch automatically withdraws the Tracer out of the way of the work.



Measurements may be taken both radially and circumferentially on the ring. The switches are so arranged that automatically the ring may be rotated or the Tracer reciprocated to obtain either type of measurement. When both radial and circumferential measurements are wanted simultaneously, the ring and the Tracer can be made to move at the same time.

Practically any size ring can be measured on the Type R Piloting Fixture. Rings as small as 2" ID and as large as 10" ID may be measured through simple adjustment of the rolls which press the ring against the driving wheel. Larger rings may be measured by providing external support for them beyond the surface plate. Small rings may be measured by means of an adaptor fitting on the driving wheel. No adjustment is needed to measure keystone rings.

The Tracer used may be either the standard Type M or the previous Type S. Any Type of Profilometer may be used. When mounted on the fixture, the Tracer is counterbalanced to minimize wear on the skids.

The Type R Fixture is another example of the adaptability of the Profilometer to measurement of surfaces of all kinds in a practical manner. Physicists Research Company maintains a completely equipped Application Engineering Department for the solution of surface-roughness measuring problems such as the one posed by piston-ring manufacturers.

Specifications:

Range: will measure rings 2" ID to 10" ID (adaptor for smaller rings, extra).

Weight: 95 pounds.

Size: 10" x 22" x 7½" (overall height).

Current requirements: 110 volts, 60 cycles (other voltages and frequencies on special order).

Physicists Research Co.

343 S. Main St., Ann Arbor, Mich.

PHYSICISTS RESEARCH COMPANY

343 SOUTH MAIN STREET

ANN ARBOR, MICHIGAN

• THE PASSING PARADE •

T. M. REG. U. S. PAT. OFF.

THE EVER-CHANGING SCENE IN MASS MANUFACTURING

Gisholt Machine Co. has announced the death of **Hugh J. Homewood**, treasurer of the company, on Nov. 7, at the age of 49. He had been affiliated with Gisholt for nearly 20 years. Prior to his election as treasurer in 1940, he had been chief accountant and office manager for 10 years.

Also announced by the company is the appointment of **L. V. Tuttle** as foundry manager. He had been associated with the Koehring Co., Milwaukee, in a similar capacity for the past 12 years.

Joseph W. McDougal has been elected president of Miller Tool & Mfg. Co., according to an announcement by the board of directors. He succeeds Alvin L. Miller, founder of the company, who will retain his post as a director.

Prior to his association with the Miller Co. in 1942, Mr. McDougal was a management consultant in Detroit for more than 10 years. He also has been associated with the Paige-Detroit Motor Car Co. and the Wabash Portland Cement Co.

Edward A. Kreller has been appointed manager of the east to shape depart-

ment of The Jessop Steel Co., according to a company announcement. For the last nine years he has held the position of works manager of the Detroit Alloy Steel Co. He is a member of the American Foundrymen's Association.

The War Production Board has announced the appointment of **Richard P. Brown**, chairman of the board of the Brown Instrument Company, and vice-president of Minneapolis-Honeywell Regulator Co., as deputy director for the Third Region.

His new duties with WPB will include maintenance of maximum production in plants engaged in war work and co-ordinating of efforts in the production drive of the Labor and Management Consultation division of WPB in Pennsylvania, New Jersey, Delaware, Maryland and Virginia.

Paul F. Zerkle, manager of the Michigan Tool Co., has announced the opening of two more factory service and sales district offices at South Bend, Ind. and Cincinnati, O.

District manager for the South Bend office will be **T. S. Mellen**, **E. W. Brock** will be in charge of the Cincinnati area.

Several personnel changes have been announced by Westinghouse Electric and Manufacturing Co.

New manager of the recently-formed Marine department is **Charles H. Weaver** who will direct all commercial activities, including co-ordination of marketing of diversified products used for marine service. He has been associated with Westinghouse since 1936.

Ralph E. Kruck, industrial designer for the company since 1931, has been named manager for the Products Design department. He formerly was a member of the engineering department of the East Springfield, Mass., plant where he designed household and commercial refrigeration and air-conditioning equipment.

C. A. Smith, formerly manager of factory service, East Pittsburgh plant, and **H. W. Tenney**, formerly assistant director of Westinghouse Research Laboratories, have been named assistants to **Thomas I. Phillips**, former vice-president in charge of the company's Pittsburgh divisions. Mr. Tenney has been associated with Westinghouse since 1920.

Died: **Irwin Edward Lang**, assistant
(Continued on page 216)

Immediate Delivery



STURTEVANT

QUALITY

Spring Tester \$12⁷⁵

(Torque Wrench not included)

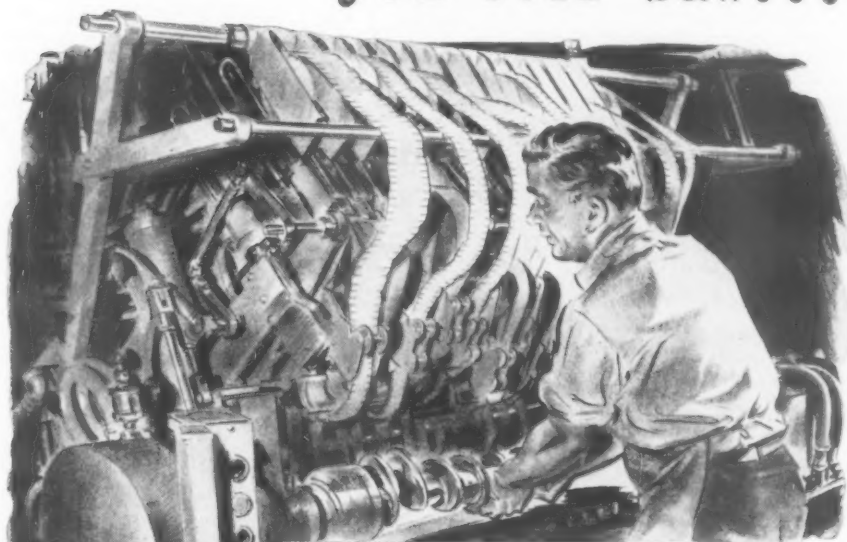
FAST, ACCURATE AND INEXPENSIVE

Using any accurate torque wrench as its measuring element, this inexpensive spring tester measures the recoil of springs up to 7" (free length) and 2 1/2" in diameter when compressed to any predetermined length. As easy to "set" as a vernier scale; as easy to operate as a light arbor press; and as easy to read as a school ruler—no multiple dials, no relative readings, no complicated computations. Just pull down the torque wrench handle, and take the direct reading when the built-in tone device sounds. Enables anyone to inspect, test, check or measure the recoil of springs in a few seconds . . . to accurately match sets of springs (as valve spring of engines) in a few minutes. Widely used for testing springs in laboratories and in heat treating, inspection, assembly and repair departments to eliminate costly guesswork in building and maintaining automotive and aircraft motors. (Note: Torque Wrench NOT INCLUDED, unless specified).

Write for Bulletin ST-28

P.A. STURTEVANT CO.
ADDISON **QUALITY** ILLINOIS

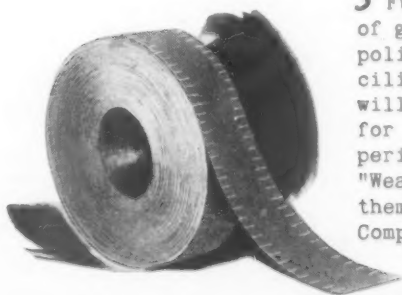
The darndest machine you ever saw...



1 It has an interesting, complex oscillating motion. It works up and down following crank contours. And it does it all at once! It's the darndest machine you ever saw! Yet it is one of the most efficient and productive machines of its type. Its job is to finish all of the bearing surfaces on a crankshaft at one fell swoop! The older method of performing this same operation is to hold the abrasive cloth in a "nutcracker," finishing only one surface at a time.



2 With the new machine, strips of successively finer grits of abrasive cloth, having serrated edges to permit the strips to follow the fillets of the bearings, are automatically inched past the revolving crankshaft from a feed roll of the cloth. And on many a job it's Aloxite Brand cloth by Carborundum that gives the ultimate smooth, satin finish.



3 Further improvements in techniques of grinding, finishing, sharpening and polishing, developed through the facilities of The Carborundum Company, will be helping to produce still more for less, now as well as in postwar period. Remember abrasive products are "Weapons for Production." Use them wisely. The Carborundum Company, Niagara Falls, N. Y.



Carborundum and Aloxite are registered trade-marks of and indicate manufacture by The Carborundum Company.

chief engineer of the Pioneer Engineering & Mfg. Co., at Detroit on Dec. 27. He was 41 years old.

Prior to joining the Pioneer organization in 1936, he was associated with the Gemmer Mfg. Co. for 17 years and with the Detroit Gear Co. for two years. He was a member of the American Society of Tool Engineers and the Engineering Society of Detroit.



Irwin E. Lang



Thomas A. Knowles

Thomas A. Knowles has been appointed vice-president of Goodyear Aircraft Corp., according to an announcement from the Board of Directors of the Goodyear Tire & Rubber Co.

Upon receiving his Bachelor of Science degree in Mechanical Engineering from the Massachusetts Institute of Technology in 1927, he joined the Goodyear organization. He has served in the tire design department, in the research department, and was successively manager of the customer engi-

neering contact department and sales manager.

Allis-Chalmers Mfg. Co. announces that **James Dalton Cunningham** of Chicago has been elected to the board of directors. He succeeds **Charles W. Cox**, a director since 1913, who resigned because of ill health.

Mr. Cunningham is president of Republic Flow Meters Co., Autogas Co., and Smoot Engineering Co. He also is a director of Lumbermans' Mutual Casualty Co., American Motorists' Insurance Co., the Public Service Company of Northern Illinois, and the National Association of Manufacturers. In addition, he is the past president of the Illinois Manufacturers Association, chairman of the board of the Illinois Institute of Technology, a member of the Western Society of Engineers, and a member of the American Society of Mechanical Engineers.

Ace Drill Corp., Detroit, announces the appointment of **Robert Brown** as sales manager covering the eastern states with headquarters in Philadelphia. Mr. Brown has been connected with the cutting tool industry for 20 years.

Ralph L. Wilson, former chief of the Constructional Steels Section of the Metallurgical and Conservation Branch, Steel Division of the War Production Board, has been named chief metallurgical engineer of The Timken Roller

Bearing Co., Canton, Ohio.

Before his present appointment he served ten years in the steel and tool division of Timken as metallurgical engineer specializing in alloys and steel tubing applications. He is well known for his work on the properties of metals at elevated temperatures.



Ralph L. Wilson



K. E. Sutton

Wright Aeronautical Corp. has announced the advancement of two veteran employees in its Wood-Ridge, N. J. plant.

K. E. Sutton, associated with the Wright Co. since 1929 has been named manager of the war-plane engine plant. He has held the post of assistant factory manager, production manager, and general superintendent of plants in the Paterson, N. J. area. He will be in charge of all managerial functions and direct operation and production.

(Continued on page 218)



One of our new engineering departments where expert production knowledge is translated into designs for production tooling equipment

★
come

industry's most efficient production tools

Foundation stones of the McKinney organization are embedded in almost 25 years of successful, highly specialized activity; and today, this organization occupies a prominent position among leaders of the industry.

Wisdom and censorship still require that certain information be held in strict confidence. It can be said, however, that tool designs for producing many amazing devices and the actual tools that have built many of our high powered war weapons, have gone forth from the McKinney plant.

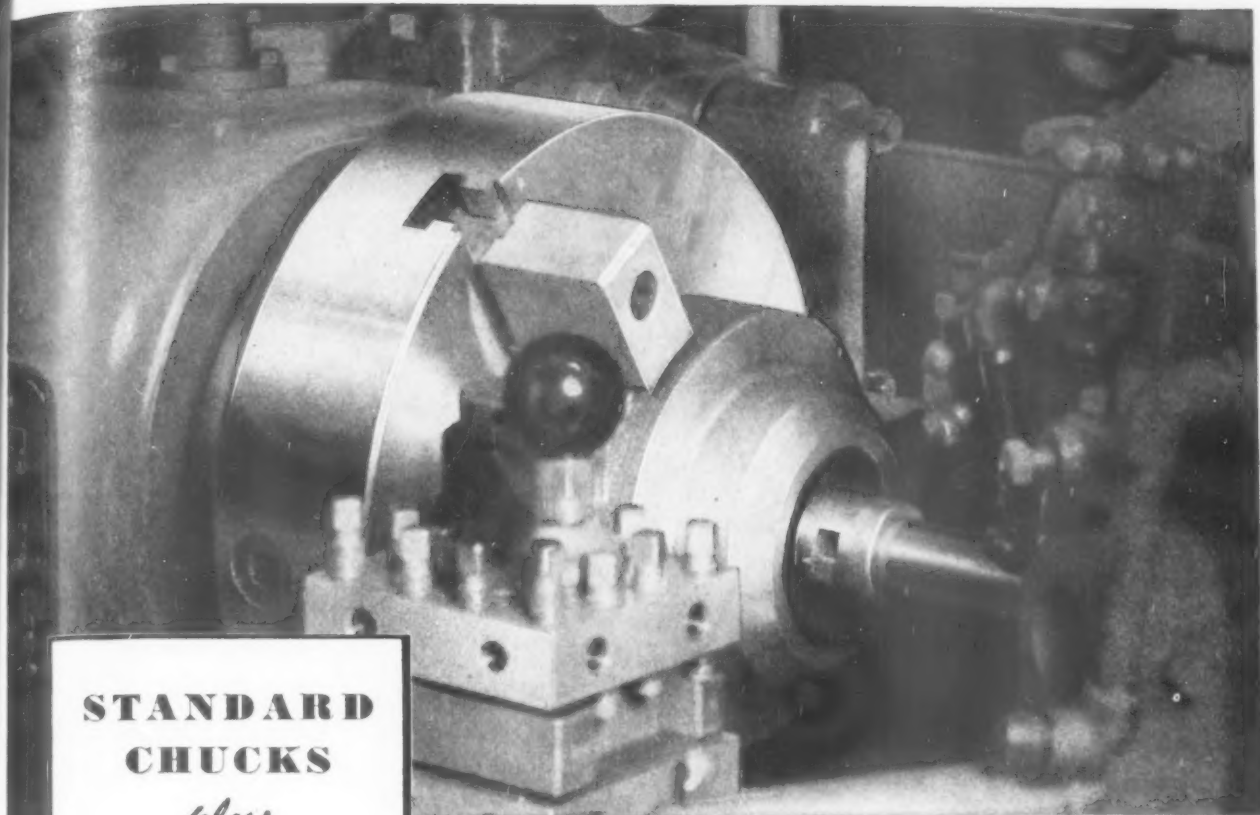
Through having done nothing else for so many years the McKinney organization is exceptionally competent to design and build tooling equipment embodying extreme

accuracy, ease and facility of operation—and capacity for large volume production.

Consult us on current or contemplated work. Drop in and inspect our plant—write for a bulletin describing our facilities—have a McKinney engineer call for a discussion—or send blueprints on any pending job on which we can possibly be of assistance.

McKINNEY
TOOL & MFG. CO.
CLEVELAND
DESIGNERS and BUILDERS
of PRECISION TOOLING
Since 1920
1291 ARABELLA ROAD
Tools-Dies-Figs-Fixtures-Special Machinery





STANDARD CHUCKS

plus

SOFT BLANK JAWS

..SAVE while they **SOLVE**
tough set-up problems

WITH the development of the American Standard two-piece jaw construction, it became very easy to hold work of unusual shapes or dimensions in standard chucks simply by machining a set of soft blank top jaws to the required form. This saved a great deal of the time and material previously put into construction of special work-holding devices and also made it possible to quickly change a machine over from one job to another by merely exchanging the removable top jaws in the chuck.



This is typical of the time and material saving short cuts that... in a thousand little ways... have enabled American Industry to out-produce our enemies before they thought we could get started. They are going to help make reconversion to civilian production equally successful.

Let Cushman work with you on present and future work-holding problems... and in the interests of Tool Conservation. The Cushman Chuck Company, Chucking Engineers Since 1850 Hartford 1, Conn.

A WORLD STANDARD FOR PRECISION



CUSHMAN CHUCKS

THIS JOB *Couldn't Be Done*



... But It Was—
Thanks to

GRAY-MILLS *Portable Coolant Systems*

THIS job of cutting magnetic steel couldn't be done, because these Radial Cutter Grinders were not originally equipped for coolants. Yet, the job was done ... by applying the coolant with Gray-Mills G-3A Portable Coolant Systems.

Today, as this application illustrates, there is no need to forego the advantages of coolants even though your machines aren't equipped with coolant applying systems. Gray-Mills Portable coolant systems are moderate in cost ... can be hooked up for operation by your own maintenance man quickly, without fuss. In savings on tools alone, Gray-Mills Systems will pay for themselves within a few months.

Gray-Mills Portable Coolant Systems offer all of the advantages of built-in systems: controlled flow; capacities up to 3000 gals. per hr., high volume, or high pressure, baffle plates and screens to filter out chips and abrasives. An automatic pressure relief valve protects the motor against overloads.

Don't deny yourself production-jumping, tool-saving, cost reducing coolants. Apply them with Gray-Mills, (self-contained) Portable Coolant Systems. Ask your mill supply or machinery distributor for a demonstration.

Write for Complete Details.

IMMEDIATE SHIPMENT

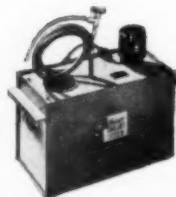
GRAY-MILLS CO.

235 W. Ontario Street ★ Chicago 10, Illinois



Complete Portable **COOLANT SYSTEMS**

Use GRAY-MILLS COOLANTS ... 5 types for most requirements—10 and 55 gal. containers—immediate delivery from your distributor or our plant.



4 Heavy Duty "A" Series Models—with large capacity coolant tanks incorporating forced settling baffles and screen strainers. Capacities from 60 to 180 G.P.H., Pressures from 15 to 50 lbs. P.S.I.



3 Model "G" Series (Round Tanks). Small compact units—with capacities from 60 to 130 G. P. H., Pressures from 10 to 20 lbs. P. S. I.

PASSING PARADE

A. M. Scheerer, has been appointed engineering manager. He will be in charge of administration and execution of the plant's entire engineering functions.

Charles C. Gorham, who has been in training school work for the past 3 years for Greenfield Tap & Die Corp., has accepted the position of chief tool supervisor with Victory Plastics Co., Hudson, Mass.

His duties will include building and directing a force of tool designers and tool and die makers to perform tool and mould work in the Victory Plastics plant, rather than on outside contract. More than 1100 trainees, apprentices, foremen, and supervisors were instructed by Mr. Gorham or were under his supervision, while he was with Greenfield.

Henry E. Miller, president of Chicago Wheel & Mfg. Co., died at Chicago, Jan. 10, following a brief illness. He was 81 years old.

Born on an Illinois farm, Mr. Miller became an expert machinist and traveling salesman for the Minnesota Thresher Co. In 1894 he was made manager of the Chicago Emery Wheel Co., which he later purchased. In 1895 he became president, and changed the firm's name to Chicago Wheel & Mfg. Co.

He was a pioneer in the mounting of small wheels on steel shanks for use in various professions and trades, and also was instrumental in perfecting a number of important bonds used throughout the industry in the manufacture of grinding wheels. He was a founder of the Grinding Wheel Manufacturers Association and was one of the oldest men in the industry.

The American Standards Association announces the appointment of S. O. Bjornberg, consulting engineer of the Illinois Tool Works, as a member of the sectional committee on small tools and machine tool elements.

Work of the committee deals with the standardization of the elements of machine tool construction, operation, and tool and work-holding elements, and is carried on by 20 technical subcommittees.

Robert W. Worley has been appointed chief engineer of the Union Drawn Steel Division of Republic Steel Corp. Prior to his new appointment, Mr. Worley was associated with United Engineers and Constructors, Inc., Philadelphia.

American Can Co. announces that George L. Spence, a ranking executive of the company for 42 years in Chicago, has retired as central division manager of manufacture and district superintendent.

Mr. Spence was associated with Norton Bros. for 5 years, prior to his connection with American Can. He had been division superintendent and manager of manufacture for the company's central division since 1913.

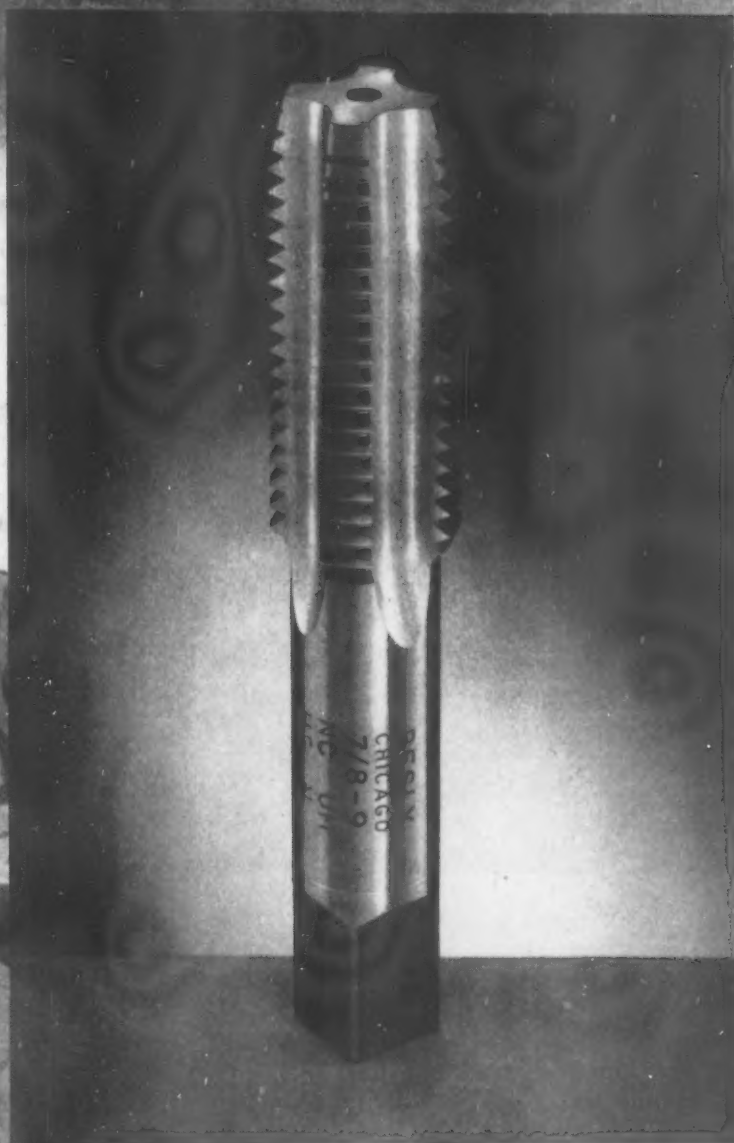
Walter W. Appleton, former assistant to the Machine Tools Controller of Canada, has resigned his position to resume the Canadian representation of

(Continued on page 220)

THE TOOL ENGINEER

BESLY

TAPS FOR PEAK PRODUCTION



● Besly Taps, through their consistent performance, are helping to maintain American production at a wartime peak—as they helped to put it there.

Besly Taps are producing accurate threads through long, difficult production runs. Their correctly designed flutes speed chip removal, prevent damage and consequent tap breakage.

The peak of production at which we find ourselves means day and night work to give you service as dependable as Besly Taps. However, we can promise prompt attention to your order, with precision-built Besly Taps following as soon as possible.

Write for Catalog No. 67—a compendium of useful knowledge for tap users.



BESLY

BESLY TAPS • BESLY TITAN ABRASIVE WHEELS
BESLY GRINDERS AND ACCESSORIES

CHARLES H. BESLY AND COMPANY • 118-124 N. CLINTON ST., CHICAGO 6, ILL. • FACTORY: BELOIT, WIS.

HAND - FINISHING

on parts for machine tools,
guns, planes, tanks, ships

REQUIRES SWISS-PATTERN FILES



For more than 40 years, "American Swiss" Swiss-Pattern Files have consistently maintained a reputation for uniform hardness, clean sharp teeth, and long wear. For better, faster filing insist on "American Swiss" . . . 3,000 different sizes and patterns. Buy from our Distributor.



Send for the "American Swiss" Catalog

American Swiss File & Tool Co., Elizabeth, N. J.

ASK FOR THEM BY NAME
American Swiss ★ ★ ★
SWISS PATTERN FILES

PASSING PARADE

Brown & Sharpe Mfg. Co. in Toronto.

Mr. Appleton was loaned by his firm to the Machine Tools Controller at the latter's request. Originally set up to last only a few months, the position was extended from time to time until increasing demands of Mr. Appleton's position with Brown & Sharpe required his resignation.

Mack Manufacturing Corp. announces the appointment of W. I. Rodgers, Jr., formerly assistant superintendent in charge of buses and shops for New York City Board of Transportation, as assistant to the chief engineer.

Mr. Rodgers returns to the Mack organization after an absence of 13 years. Prior to 1930 he served the organization as bus engineer.

Allegheny Ludlum Steel Corporation announces that Paul E. Floyd, on leave of absence for more than a year to serve in a responsible post in the Iron & Steel Branch of the War Production Board, has returned to his former position as district manager in the Chicago branch of the corporation.

Mr. Floyd left the company early in 1942 to serve with the WPB at that agency's request.

Kaydon Engineering Corp. has announced the appointment of B. M. Staley as factory manager.

For the past 12 years, he has been



B. M. Staley

associated with the rotary pump division of National Transit Pump & Machinery Co., where he served successively as chief engineer, superintendent, and plant manager.

Prior to his service with National Transit, he was connected with Pittsburgh Machine Tool Co. and Curtis Pump Co.

James Terry has been appointed district manager of the Cincinnati sales office and warehouse of the Columbia Tool Steel Co. He succeeds W. G. Sonderman, who died recently.

Mr. Terry has been associated with the company for several years, and now fills the position held for more than 26 years by his father, F. A. Terry, who has retired.

Kelly Reamer Co. has announced the appointment of Louis M. Edgar as exclusive sales and engineering repre-

(Concluded on page 222)

Ettco-Emrick

FOOT-OPERATED TAPPING MACHINE

**eliminates the
human element
from tapping--**

From the 2-spindle Head, with its hair-trigger sensitive friction clutch and automatic reverse, right down to the delicately counter-balanced foot pedal, the Ettco-Emrick Tapping Machine is designed and built to make high speed, accurate tapping sure and easy.

All the operator has to do is feed the work and step on the foot pedal. The skill ordinarily needed in tapping and the speed are provided by the exclusive Ettco-Emrick design features.

That's why unskilled operators—men or girls—can easily maintain productions up to **2400 holes per hour** with the standard head, and all the way up to **12,000 holes per hour** with available Ettco-Emrick Multiple Spindle Heads.

FOR DETAILS WRITE FOR THESE BULLETINS

BULLETIN No. 4 covers the Tapping Machine.

BULLETIN No. 3 covers the Multiple Heads.

Copies mailed to you on request.

IMPORTANT

Recommendations on the best way to handle specific tapping jobs are always available to users of

ETTCO-EMRICK equipment.



A 2-Spindle Head is standard equipment on the Tapping Machine

ETTCO TOOL CO.

586 Johnson Ave., Brooklyn 6, N. Y.
Detroit • Chicago

The Famous **Ettco-Emrick** DRILL CHUCKS • TAP HOLDING CHUCKS
TAPPING ATTACHMENTS • TAPPING MACHINES
MULTIPLE SPINDLE TAPPING AND DRILLING HEADS
Unexcelled for Design, Materials and Workmanship

GET BIG PRODUCTION FROM UNSKILLED WORKERS!
Every dollar invested in
BOICE-CRANE SAFETY-ENGINEERED PRECISION-BUILT SHOP-TESTED **POWER TOOLS**
does the work of two spent on oversize machines
You can get **QUICK DELIVERY** from Boice-Crane

Performance Proves its Superiority BOICE - CRANE No. 2600 HELMET HEAD DRILL PRESS Over 75 Models

The most durable, sensitive press in its class.

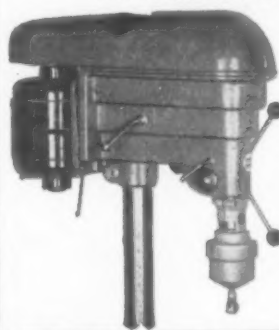
One, two, three and four spindle types. High and slow speed; bench or floor type; slotted or trough table. Perfectly balanced. Vibrationless.

Sealed against hazards common in other presses. The only drill press under \$100.00 with an approved guard; the first guard that allows easy speed changing.

5 carefully predetermined efficient speeds, one for every operation. New self-centering 30-degree pressure angle 6-tooth involute spline. Spindle, quill, and spindle-pulley are held in permanent, perfect alignment.

The longer, larger diameter quill is held by three bearings, permitting long holes to be drilled more accurately than by other presses in same price range.

BOICE-CRANE TAPPING HEADS for Helmet Head Drill Presses



Do light tapping better, cleaner, more economically. Operate at 3000 r.p.m. "IN"; faster than others, and 6000 r.p.m. "OUT". Taps enter every hole centrally and without slightest strain. 2 sizes.



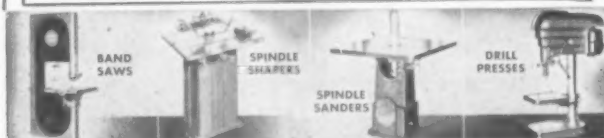
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934 Central Ave., Toledo, Ohio

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Street _____

City _____



IF YOU WELD . . . You need the DOWNHAND POSITION



Low-cost 500-lb. capacity unit, available either hand-operated or motor-operated

Here's why you need it . . .

Most important, it will greatly increase your welding production. In many cases, it means that you can do a job in one pass that would require two, three, or more passes when the weldment cannot be placed in the ideal downhand position.

It means smoother, stronger, welds . . . time saved in both handling and welding . . . rod savings . . . and the good will of your welders.

Here's how you can get it . . .

Install Ransome Welding Positioners. With this equipment, your welders can shift their work at will, without crane service, without loss of time, without wasting precious physical energy. Every seam is just where it should be . . . in position for downhand welding.

There's a unit to fit every welding job. Write for full information.

Units on display at National Wartime Metal Congress . . . October 18 to 22 . . .
Room 876, Palmer House, Chicago



Capacities 500-lb. to 40,000-lb., hand and motor-operated . . . Head-stocks and Tail-stocks . . . Turning Rolls

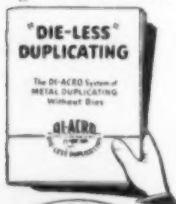
THE RANSOME DIVISION • RANSOME MACHINERY COMPANY • LIVINGSTON, NEW JERSEY
Subsidiary of WORNINGTON TOOL AND MACHINERY CORPORATION

Ransome. WELDING POSITIONERS

METAL Stampings

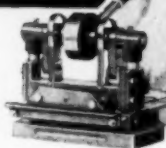
DUPLICATED
WITHOUT
DIES

If you desire to save time and critical materials on production of metal stampings or other small parts, then the DI-ACRO System of "Metal Duplicating Without Dies" merits your consideration. It is based on the rapid and accurate production of formed parts with DI-ACRO Shears, Brakes and Benders. All duplicated work is accurate to .001". These precision machines are adaptable to an endless variety of work, and ideally suited for use by girl operators. For short runs your parts are processed in a matter of hours instead of waiting weeks for dies.



Send for this Catalog
"DIE-LESS
DUPLICATING"

It illustrates many stampings or parts made without dies, gives full details on DI-ACRO machines and shows how they may readily be adapted for various applications. Request your copy now.



SHEARS



BRAKES



BENDERS



O'NEIL-IRWIN MFG. CO.

307 Eighth Ave. So.
Minneapolis 15, Minn.

PASSING PARADE

sentative for Michigan. He will be located in the Cadillac Square Building, Detroit.

Several personnel changes and appointments have been announced by Carborundum Co.

E. R. Baxter has been named assistant to the vice-president in charge of sales. John F. Claydon, formerly an industrial salesman, has been appointed district sales manager at Boston. He succeeds Fred W. Bonacker, who has been assigned to special sales work. New district sales manager at Cleveland is A. A. Murfey.

George E. Westerholm has been named an abrasive engineer for the Norton Co. in the Milwaukee territory, according to a company announcement.

A Norton employee for 21 years, Mr. Westerholm has served in the company's research laboratories and more recently as field engineer serving steel mills and foundries.

Timken Roller Bearing Co. has announced several personnel changes. A. M. Donze, factory manager for eight years has been made vice-president in charge of production. H. M. Richey, formerly assistant to Mr. Donze, has been appointed factory manager.

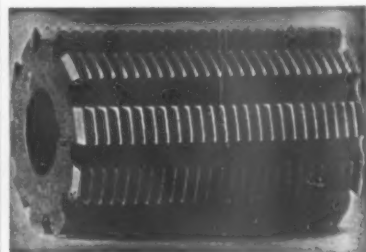
Walter G. Hildorf, widely-known metallurgical veteran, has been named director of metallurgy, a newly created office. He formerly was chief metallurgical engineer.

John E. Fick has been promoted from superintendent of the steel and tube division to division vice-president.

THE END

6 DAYS DELIVERY on THREAD MILLING CUTTERS

CLASS 1, 2 or 3 FIT,
COMBINATION FORM
CUTTERS & INVOLUTE
SPUR GEAR CUTTERS,
14 1/2° AND 20° P.A.



GROUND PRECISION
THREAD CHASERS FOR
THREADING MACHINE

Send Blueprints and Specifications

U. S. MACHINE TOOL MFG. CORP.
Clinton, Indiana Phone 85

CAN BE
THROTTLED
without building up pressure



GUSHER COOLANT PUMPS

... and less power is consumed when Gusher Coolant Pumps are either partially or totally throttled. Easy adaptability for quick change-overs. No packing glands to leak, consume power or require adjustment. Learn about other advantages of Gusher Coolant Pumps. There's a model and type for your needs. Write for new complete catalogue.

Model 9040 — Available in any current characteristics, including 25 cycle, 1, 2, or 3 phase. Totally enclosed 1/4 h.p. motor.

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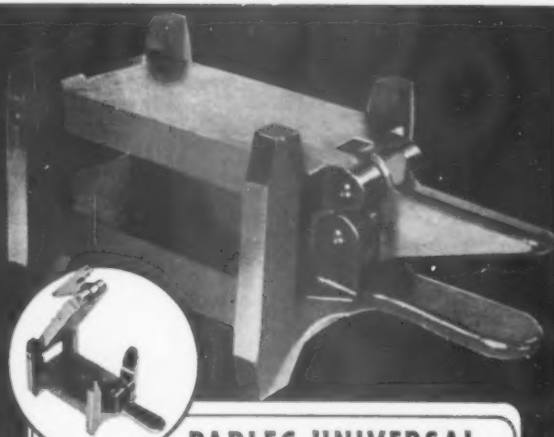


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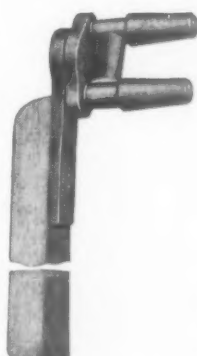
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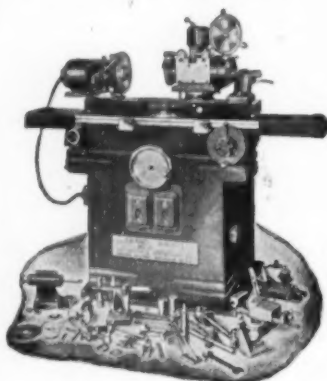
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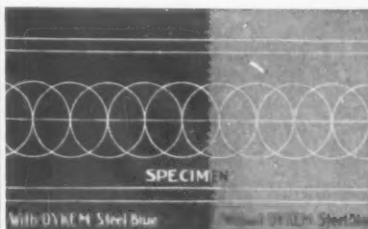
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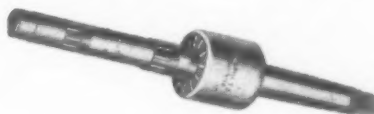
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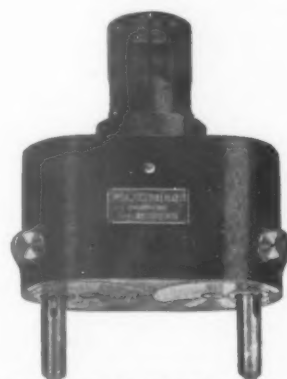
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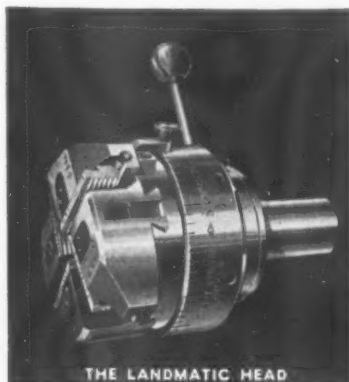
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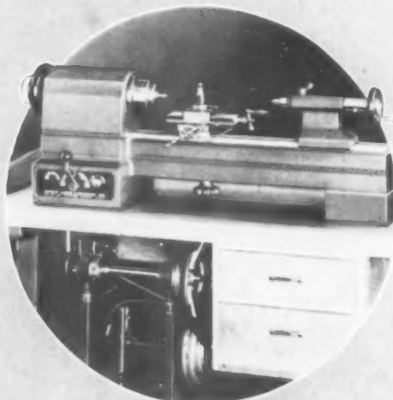
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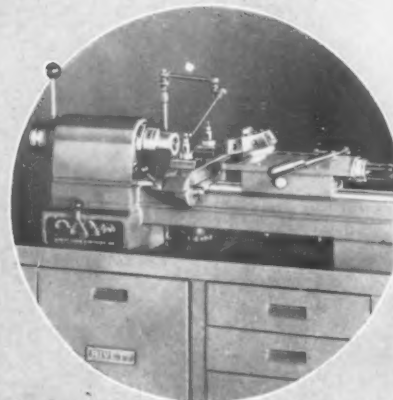
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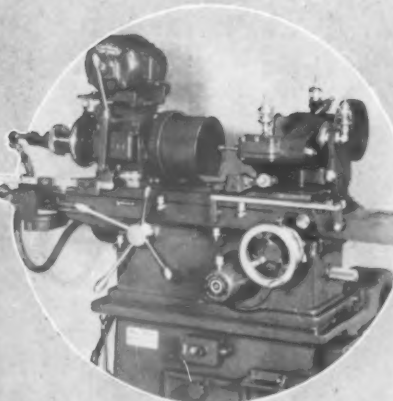
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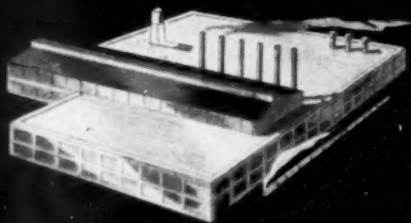
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RIVETT LATHE & GRINDER INC.

BRIGHTON, BOSTON, MASS., U.S.A.

out of obscurity



into the sun



There is a brighter side. From \$319 in 1914, net income per capita in these United States climbed to \$875 (est) in 1943. Increase in cost of living jumped 76% in the 1913-1918 period of War I. The first five years (1938-1943) of World War II show a climb of 24%. Close of 1944 may well see an accumulated

"buying reservoir" of \$100,000,000 in American socks. Your plant expanded for war. How about your vision? Has it expanded to include the "peacework" future? To turn a profit, then, calls for turning, now, from production at any cost to production at lowest cost. Look at your lathes, for instance. Then look to LeBlond.

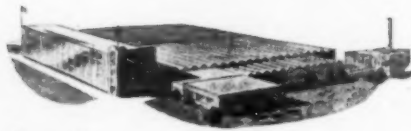
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LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES



HD Engine Lathes—Nine sizes ranging from 12" to 50" swings. For versatility in turning.

Automatic Lathes—12" & 16" Mechanical or Hydraulic power.

Super Regal Lathes—Six sizes, 13" to 24" Best for training.

Automatic Crankshaft Lathes—For all facing, turning, finishing, pins.

Tool Room Lathes—12", 14", 16" and 18" swings. Versatile.

HD Gap Lathes—Ten sizes in Regular and Sliding Gap models.

Rapid Production Lathes—13", 17", 20" swings. Six speeds. Faster output. Lower cost.

No. 2 Cutter Grinder—Internal, cylindrical, face and angular work.

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- ☐ TOOL ROOM LATHES
- ☐ AUTOMATIC LATHES
- ☐ HEAVY DUTY GEARED HEAD GAP LATHES
- ☐ SUPER REGAL GEARED HEAD LATHES
- ☐ RAPID PRODUCTION LATHES
- ☐ AUTOMATIC CRANKSHAFT LATHES
- ☐ No. 2 CUTTER GRINDER

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BUY A LE BLOND TODAY!**

